
Work Order No. 03917.008.012

**No. 3 Recovery Furnace
Particulate Matter, Nitrogen Oxides,
Sulfur Dioxide, and Carbon Monoxide
Emission Compliance Test Report**

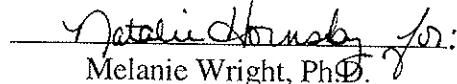
**Bowater Incorporated
Catawba, South Carolina
24 July 2007**

Prepared For

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SECTION 1 INTRODUCTION

Weston Solutions, Inc. (WESTON[®]) was retained by Bowater Incorporated (Bowater) to conduct particulate matter (PM), nitrogen oxides (NO_x), sulfur dioxide (SO₂), and carbon monoxide (CO) emission testing on the No. 3 Recovery Furnace at the mill in Catawba, South Carolina. The purpose of the emission testing was to demonstrate compliance with the South Carolina Department of Health and Environmental Control (DHEC) permit limits.

WESTON performed the emission testing on 24 July 2007. The project team included the following individuals.

Name	Project Role
Temp Simpkins	Project Manager/Test Team Leader
Melanie Wright	Quality Assurance Manager
Billy Routhier	Test Team Member
Logan Waites	Test Team Member
Natalie Hornsby	Report Coordinator

Mr. Larry Bowling of Bowater coordinated the testing with mill operations and served as WESTON's technical contact throughout the effort. A representative of DHEC was not present for testing.



SECTION 2 RESULTS AND DISCUSSION

Table 2-1 provides a detailed summary of the emission results. Any differences between the calculated results presented in the appendices and the results reported in the summary table are due to rounding for presentation.

**TABLE 2-1
NO. 3 RECOVERY FURNACE
SUMMARY OF PM, NO_x, SO₂, AND CO EMISSION RESULTS**

	Run 1	Run 2	Run 3	Mean
Date	7/24/07	7/24/07	7/24/07	----
Time Began	1141	1324	1533	----
Time Ended	1244	1427	1636	----
Stack Gas Data				
Temperature, °F	363	367	366	365
Velocity, ft/sec	81	82	82	82
Moisture, %	28	27	24	27
CO ₂ Concentration, %	14.5	13.5	13.4	13.8
O ₂ Concentration, %	5.5	5.5	5.5	5.5
VFR, x 10 ⁵ dscfm	1.93	2.00	2.05	1.99
Particulate Matter				
Isokinetic Sampling Rate, %	101	102	98	100
Concentration, gr/dscf	0.023	0.018	0.014	0.018
Concentration, gr/dscf @ 8% O ₂	0.019	0.015	0.012	0.015
Permit Limit, gr/dscf @ 8% O₂	----	----	----	0.025
Nitrogen Oxides				
Concentration, ppm	62.0	63.0	65.0	63.3
Concentration, ppm @ 8% O ₂	51.9	52.8	54.4	53.1
Permit Limit, ppm @ 8% O₂	----	----	----	78
Sulfur Dioxide				
Concentration, ppm	<1.0	<1.0	<1.0	<1.0
Concentration, ppm @ 8% O ₂	<0.8	<0.8	<0.8	<0.8
Emission Rate, lb/hr	<1.9	<2.0	<2.0	<2.0
Permit Limit, lb/hr	----	----	----	270
Carbon Monoxide				
Concentration, ppm	247	180	167	198
Concentration, ppm @ 8% O ₂	207	151	140	166
Emission Rate, lb/hr	208	157	150	171
Permit Limit, lb/hr	----	----	----	235



SECTION 3

SOURCE TESTING METHODOLOGY

The emission testing program was conducted in accordance with the U.S. EPA Reference Methods summarized in Table 3-1. Method descriptions and quality assurance data are provided in the referenced appendices.

TABLE 3-1
SOURCE TESTING METHODOLOGY

Parameter	Method Number	Appendix Reference		Comments
		Method Description	Quality Control Data	
Volumetric Flow Rate	1,2,3A,4	B.1	E	
Particulate Matter	5	B.2	E	
Sulfur Dioxide	6C	B.3	E	
Nitrogen Oxides	7E	B.4	E	
Carbon Monoxide	10	B.5	E	



APPENDIX A

SAMPLE CALCULATIONS

SAMPLE CALCULATIONS

No. 3 Recovery Furnace Run No. 1

Meter Pressure (Pm), in. Hg

$$P_m = P_b + \frac{\Delta H}{13.6 \text{ in. } H_2O/\text{in. Hg}}$$

where, Pb = barometric pressure, in. Hg
 ΔH = Pressure differential of orifice in. H_2O

$$P_m = 29.55 \text{ in. Hg} + \frac{1.586 \text{ in. } H_2O}{13.6 \text{ in. } H_2O/\text{in. Hg}} = 29.67 \text{ in. Hg}$$

Absolute Stack Gas Pressure (Ps), in. Hg

$$P_s = P_b + \frac{P_g}{13.6 \text{ in. } H_2O/\text{in. Hg}}$$

where, Pb = barometric pressure, in. Hg
Pg = Static Pressure, in. H_2O

$$P_s = 29.55 \text{ in. Hg} + \frac{-0.97 \text{ in. } H_2O}{13.6 \text{ in. } H_2O/\text{in. Hg}} = 29.48 \text{ in. Hg}$$

Standard Meter Volume (Vmstd), dscf

$$V_{mstd} = \frac{17.64 \text{ }^{\circ}\text{R/in. Hg} \times Y \times V_m \times P_m}{T_m}$$

where, Y = meter correction factor
Vm = meter volume, cf
Pm = meter pressure, in. Hg
Tm = meter temperature, $^{\circ}\text{R}$

$$V_{mstd} = \frac{17.64 \text{ }^{\circ}\text{R/in. Hg} \times 1.009 \times 41.184 \text{ cf} \times 29.67 \text{ in. Hg}}{566 \text{ }^{\circ}\text{R}} = 38.441 \text{ dscf}$$

Standard Wet Volume (Vwstd), scf

$$V_{wstd} = 0.04707 \text{ ft}^3/\text{mL} \times V_{lc}$$

where, V_{lc} = volume of H_2O collected, mL

$$V_{wstd} = 0.04707 \text{ ft}^3/\text{mL} \times 322.3 \text{ mL} = 15.171 \text{ scf}$$

Moisture Fraction (Measured), (Bws)

$$B_{ws} = \frac{V_{wstd}}{(V_{wstd} + V_{mstd})} = \frac{15.171 \text{ scf}}{15.171 \text{ scf} + 38.441 \text{ dscf}} = 0.283$$

where, V_{wstd} = standard wet volume, scf
 V_{mstd} = standard meter volume, dscf

Moisture, % (M %)

$$M\% = B_{ws} \times 100 = 0.283 \times 100 = 28.3$$

where, B_{ws} = moisture fraction, measured or at saturation, whichever is lowest

Molecular Weight (DRY) (Md), lb/lb-mole

$$Md = (0.44 \times \% \text{ CO}_2) + (0.32 \times \% \text{ O}_2) + (0.28(100 - \% \text{ CO}_2 - \% \text{ O}_2))$$

$$Md = (0.44 \times 14.5) + (0.32 \times 5.5) + (0.28(100 - 14.5 - 5.5)) = 30.54 \text{ lb/lb - mole}$$

Molecular Weight (WET) (Ms), lb/lb-mole

$$Ms = Md (1 - B_{ws}) + 18(B_{ws})$$

where, Md = molecular weight (DRY), lb/lb-mole
 B_{ws} = moisture fraction, dimensionless

$$Ms = 30.54 \text{ lb/lb - mole} (1 - 0.283) + 18(0.283) = 26.99 \text{ lb/lb - mole}$$

Average Velocity (Vs), ft/sec

$$Vs = 85.49 \frac{ft}{sec} \sqrt{\frac{(lb/lb - mole)(in. Hg)}{(^oR)(in. H_2O)}} \times Cp \times \sqrt{\Delta P_{avg.}} \times \sqrt{\frac{T_s}{P_s \times M_s}}$$

where, C_p = pitot tube coefficient
 ΔP = velocity head of stack gas, in. H_2O
 T_s = absolute stack temperature, oR
 P_s = absolute stack gas pressure, in. Hg
 M_s = molecular weight of stack gas, lb/lb-mole

$$Vs = 85.49 \frac{ft}{sec} \sqrt{\frac{(lb/lb - mole)(in. Hg)}{(^oR)(in. H_2O)}} \times 0.84 \times 1.106 \text{ in. } H_2O \times \sqrt{\frac{823 \text{ } ^oR}{29.48 \text{ in. } Hg \times 26.99 \text{ lb/lb - mole}}}$$

$$Vs = 80.79 \text{ ft/sec}$$

Average Stack Gas Flow at Stack Conditions (Qa), acfm

$$Qa = 60 \text{ sec/min} \times Vs \times A_s \quad \text{where, } Vs = \text{stack gas velocity, ft/sec}$$

$$A_s = \text{cross-sectional area of stack, ft}^2$$

$$Qa = 60 \text{ sec/min} \times 80.79 \text{ ft/sec} \times 87.97 \text{ ft}^2 = 4.26 E + 05 \text{ acfm}$$

Average Stack Gas Flow at Standard Conditions (Qs), dscfm

$$Qs = 17.64 \frac{^oR}{in. Hg} \times Qa \times (1 - B_{ws}) \times \frac{P_s}{T_s}$$

where, Qa = average stack gas flow at stack conditions, ft^3/min
 B_{ws} = moisture content (dimensionless)
 P_s = absolute stack gas pressure, in. Hg
 T_s = absolute stack temperature, oR

$$Qs = 17.64 \frac{^oR}{in. Hg} \times 4.26 E + 05 \frac{acf}{min} \times (1 - 0.283) \times \frac{29.48 \text{ in. } Hg}{823 \text{ } ^oR} = 1.93 E + 05 \text{ dscfm}$$

Percent Isokinetic Sampling Rate (%I)

$$\% I = \frac{0.0945(\text{in. Hg})(\text{min})/(\text{°R})(\text{sec}) \times T_s \times V_{mstd}}{P_s \times V_s \times A_n \times \Theta \times (1 - B_{ws})}$$

where,
 Ts = avg. stack temperature, °R
 Vmstd = standard meter volume, dscf
 Ps = absolute stack gas pressure, in. Hg
 Vs = stack gas velocity, ft/sec
 An = cross-sectional area of nozzle, ft²
 Θ = total sampling time, min
 Bws = moisture content (dimensionless)

$$\% I = \frac{0.0945(\text{in. Hg})(\text{min})/(\text{°R})(\text{sec}) \times 823^\circ R \times 38.441 \text{ dscf}}{29.48 \text{ in. Hg} \times 80.79 \text{ ft/sec} \times 2.89 \times 10^{-4} \text{ ft}^2 \times 60 \text{ min} \times (1 - 0.283)}$$

$$\% I = 101.2$$

Particulate Matter Concentration at Standard Conditions (Cs), gr/dscf

$$Cs = 15.43 \frac{gr}{g} \times \frac{Mn}{V_{mstd}} = 15.43 \frac{gr}{g} \times \frac{0.0572 g}{38.441 \text{ dscf}} = 0.0230 \text{ gr/dscf}$$

where,
 Mn = particulate matter collected, g
 Vmstd = std. meter volume, dscf

Particulate Matter Concentration Corrected for O₂, Cs @ 8% O₂

$$Cs, \frac{gr}{dscf} \times \frac{20.9 - 8\% O_2}{20.9 - \text{measured \% } O_2}$$

Note: O₂ corrections are based on source category
 or specific sources, i.e. 10% for Lime Kilns
 8 % for Recovery Boilers

$$= 0.023, \frac{gr}{dscf} \times \frac{20.9 - 8\% O_2}{20.9 - 5.5\% O_2}$$

$$= 0.0193$$

Particulate Matter Emission Rate (PMR), lb/hr

$$PMR = \frac{Cs \times Qs \times 60 \frac{\text{min}}{\text{hr}}}{7000 \frac{\text{gr}}{\text{lb}}}$$

where, Cs = particulate conc. at std. cond., gr/dscf
Qs = avg. stack gas flow at std. cond., dscf/min

$$PMR = \frac{0.023 \frac{\text{gr}}{\text{dscf}} \times 1.93 E + 05 \frac{\text{dscf}}{\text{min}} \times 60 \frac{\text{min}}{\text{hr}}}{7000 \frac{\text{gr}}{\text{lb}}} = 38.0 \text{ lb/hr}$$

Particulate Matter Emission Factor (PMF), lb/ton BLS

$$PMF = \frac{\text{lb/hr}}{\text{ton ADTP/hr}}$$

$$PMF = \frac{38.0}{48}$$

$$PMF = 0.79 \text{ lb/ton ADTP}$$

NO_x Emission Rate (EMR), lb/hr

$$EMR = \frac{\text{conc.} \times Mw \times Qs \times 60 \frac{\text{min}}{\text{hr}} \times 28.32 \frac{\text{L}}{\text{dscf}}}{24.04 \frac{\text{L}}{\text{g - mole}} \times 1.0 \times 10^6 \frac{\mu\text{L}}{\text{L}} \times 454 \frac{\text{s}}{\text{lb}}}$$

$$EMR = \frac{62 \times 46.01 \times 1.93 E + 05 \times 60 \times 28.32}{24.04 \times 1.0 \times 10^6 \times 454}$$

$$EMR = 85.8$$

NO_x Emission Factor (EMF), lb/ton ADTP

$$EMF = \frac{\text{lb/hr}}{\text{ton ADTP/hr}}$$

$$EMF = \frac{85.8}{48}$$

$$EMF = 1.79 \text{ lb/ton ADTP}$$



APPENDIX B

TEST METHODOLOGY

- B.1 VOLUMETRIC FLOW RATE**
- B.2 PARTICULATE MATTER**
- B.3 SULFUR DIOXIDE**
- B.4 NITROGEN OXIDES**
- B.5 CARBON MONOXIDE**

B.1 VOLUMETRIC FLOW RATE

Mass emission rates are calculated by multiplying measured target analyte concentrations by calculated volumetric flow rates. Volumetric flow rates are calculated using measurement data obtained by EPA Reference Methods 1-4.

The ductwork is measured at the sample location to the nearest 0.25 inch using a steel tape measure. Traverse points are selected in accordance with EPA Reference Method 1 on the basis of ductwork dimensions, geometry, and upstream and downstream disturbances. When a sample location does not meet EPA Reference Method 1 criteria, the maximum recommended number of traverse points is used.

Gas Velocity

The velocity of the gas stream is measured in accordance with EPA Reference Method 2 by reading the instantaneous velocity pressure with an inclined manometer at each traverse point using either a standard "P" type or an "S" type pitot tube. The stack pressure is calculated from the measured static pressure of the stack and the ambient barometric pressure. The static pressure is measured by using the static side of the pitot tube, and the barometric pressure is measured using a calibrated aneroid barometer. Magnahelic® gauges with scales of 0 to 5 and 0 to 25 inches of water or an inclined manometer with a scale of 0 to 10 inches of water are used for velocity pressure measurements. Manometer selection is determined by the velocity pressure of the gas stream. A manometer with a 0 to 0.25 inch scale may be used when the velocity pressure of the gas stream is less than 0.02 inches of water. By convention, any measured velocity pressures of less than 0.005 inches of water are recorded and reported as less than 0.005 inches of water. The stack temperature is measured with a calibrated thermocouple and pyrometer.

For low velocity pressure measurements (less than 0.005 inches of water) a hot wire anemometer may be used to measure the velocity of the gas stream. The indicated velocity is used without correction when the gas stream is ambient air with a moisture content of less than 65%. The indicated velocity is corrected in accordance with procedures specified by the manufacturer when the moisture content exceeds 65% or when the dry gas fraction is something other than ambient air.

Gas Composition and Moisture Content

The composition of the gas stream is measured in accordance with EPA Reference Method 3A using an analyzer.

Integrated samples are collected by withdrawing a sample from the source through a moisture condenser into a Tedlar® sample bag. The bag is then analyzed using a calibrated O₂/CO₂ analyzer.

The moisture content of the gas stream is determined using one of the following procedures:

- For sources requiring testing by EPA Reference or Test Methods 5, 8, 12, 13, 17, 23, 26A, 29, 0010, or 0011, moisture is determined by EPA Reference Method 4. At the conclusion of each run the volume of condensed moisture in the impingers of the sampling train is measured and used to calculate the moisture content of the gas stream.
- For sources with temperatures greater than 212 °F, the approximation technique described in EPA Reference Method 4 may be used with midget impingers to condense moisture before dry gas volume measurement.
- For sources with a temperature of less than 212 °F, wet bulb/dry bulb temperature measurements may be made, and the moisture content calculated using vapor pressure tables.

When multiple methods are used for moisture determinations, the lowest moisture value is used for volumetric flow calculations.

The molecular weight of the gas stream is calculated using the measured moisture, oxygen, and carbon dioxide concentrations. The balance of the gas stream is assumed to be nitrogen. The volumetric flow is then calculated at stack and standard conditions using the calculated molecular weight, the measured stack temperature, and measured velocity, stack and barometric pressures. Standard conditions are 68 °F and 29.92 inches of mercury and 0% moisture.

Data Acquisition and Reporting

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed (where possible) with preprogrammed calculators or spreadsheet software.

Quality Control

Quality control procedures for volumetric flow measurements involve leak checks of pitot tubes, pitot tube lines and manometers; periodic analysis of ambient air and duplicate analysis of source gas samples with the Fyrite analyzer; triplicate analysis with the Orsat analyzer; and periodic calibration checks of thermocouples and pyrometers.

Data transfers are minimized. Data sheets are checked for completeness and accuracy. Calculations are verified by a second person.

B.2 PARTICULATE MATTER

Particulate matter (PM) emission testing is conducted using EPA Reference Method 5. EPA Reference Methods 1-4 are used, as appropriate, for traverse point selection, determination of stack gas molecular weight, stack gas moisture determination, and volumetric flow rate.

Sampling Equipment and Procedures

The sampling train utilized to perform the PM sampling is an EPA Reference Method 5 train manufactured by Graseby-Nutech, Graseby-Anderson, or Apex Instruments (see Figure B-1). A measured borosilicate, quartz glass, or stainless steel (316) nozzle is attached to a heated (248 ± 25 °F) borosilicate or quartz glass, or stainless steel probe of appropriate length. The probe is connected to a heated (248 ± 25 °F) borosilicate glass filter holder containing a 9-cm glass fiber filter (preweighed to a constant 0.1 mg weight). The first and second impingers each contain 100 mL of distilled water, the third impinger is empty, and the fourth impinger contains 200 to 300 grams of dry preweighed silica gel. The second impinger is a standard Greenburg-Smith type. The first, third, and fourth impingers are of a modified design. All impingers are maintained in a crushed ice bath. A gas measuring control console with a leak-free vacuum pump, a calibrated dry gas meter, a calibrated orifice, and inclined manometers are connected to the final impinger, probe, heated filter holder, and pitot tube via an umbilical cord to complete the train.

Flue gas velocity is measured with a calibrated S-type pitot tube (provided with extensions) fastened alongside the sampling nozzle. Flue gas temperature is monitored with a calibrated direct readout pyrometer equipped with a chromel-alumel (Type K) thermocouple positioned near the sampling nozzle. The probe, filter box, and impinger exit gas temperatures are monitored with a calibrated direct readout pyrometer equipped with Type K thermocouples positioned in the probe, heated filter chamber, and in the sample gas stream after the last impinger. Stack gas stream composition (carbon dioxide and oxygen content) is determined as previously described. The sampling rate is adjusted, based on stack velocity, at each point to ensure the sample is collected isokinetically.

At the conclusion of each test, the sampling train is leak checked. Upon completion of a successful leak check, the sampling train is dismantled, openings are sealed, and the components recovered as described below.

- The glass fiber filter(s) is/are removed from its holder with tweezers and placed in its original container, along with any particulate and filter fragments (Sample Fraction 1).

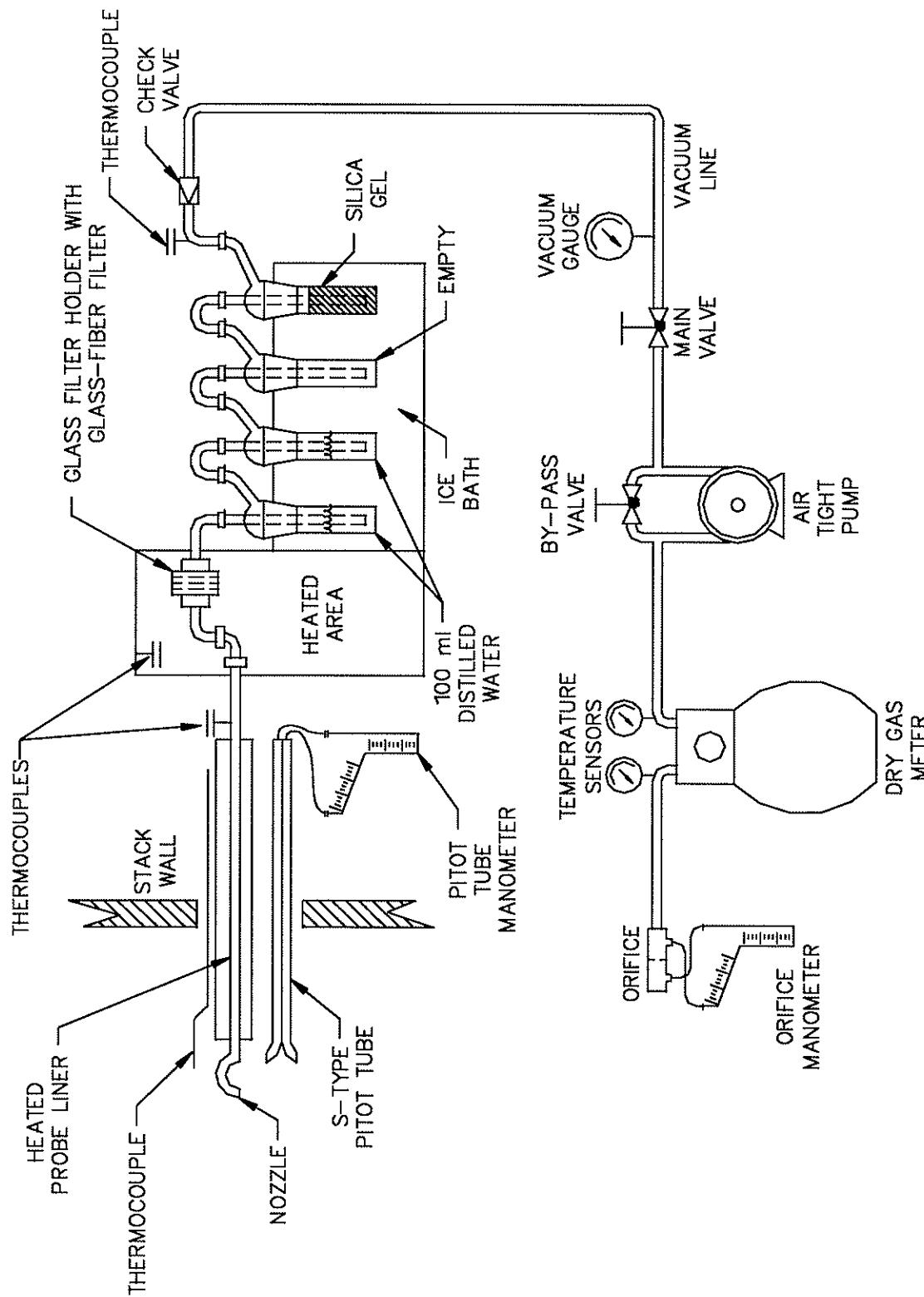


Figure B-1 EPA Reference Method 5 Sampling Train

- The probe and nozzle are separated and the particulate rinsed with distilled water or acetone into a polyethylene container while brushing a minimum of three times. Particulate adhering to the brush is rinsed with the appropriate solvent into the same container. The front half of the filter holder and connecting glassware are also rinsed. These rinses are combined (Sample Fraction 2).
- The total liquid content of impingers one, two, and three are measured volumetrically for stack gas moisture content calculation. This liquid is discarded.
- The silica gel is removed from the last impinger and immediately weighed to the nearest 0.1 g for stack gas moisture content calculation.
- Aliquots of the appropriate solvents and a filter are retained for blank analyses.

Each sample bottle is labeled to clearly identify its contents. The liquid level is marked on each bottle. The samples are then secured for transport to a laboratory for analysis. Sample integrity is assured by maintaining chain-of-custody records.

Sample Analysis

The particulate analysis proceeds as follows:

- The sample filters (Sample Fraction 1) and blank filter are desiccated for 24 hours and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weight.
- The nozzle, probe, and front half of the filter holder wash samples (Sample Fraction 2), along with the solvent blank, are evaporated in tared beakers, then desiccated and weighed to the nearest 0.1 mg to constant (± 0.5 mg) weights.

The total weight of material measured in the front half wash in addition to the weight of material collected on the glass fiber filter represent the total PM catch for each train. Blank corrections are made where appropriate for all sample weights.

Data Acquisition and Reduction

Data are recorded at the time of collection on preprinted data sheets. Calculations are performed with preprogrammed calculators or spreadsheet software. Data transfers are minimized. Field and laboratory data sheets are checked for completeness and accuracy. Calculations are verified by a second person.

Quality Control

Dry gas meters are calibrated before and after sampling. Thermocouples are calibrated against mercury thermometers, and aneroid barometers are calibrated against a mercury barometer. WESTON participated satisfactorily in the most recent dry gas meter audit supplied by the EPA. Those data are on file at WESTON.

Prior to and following each run, the sampling train is leak checked. An acceptable leak rate does not exceed the lesser of 0.02 actual cubic feet per minute (acf m) or 4% of the actual sampling rate. The isokinetic sampling rate is calculated at the completion of each sample run. If the isokinetic sampling rate is not within $100\% \pm 10\%$, the sample run is repeated.

Samples are transported to the laboratory under chain-of-custody. Solvent blanks and filter blanks are analyzed at the same time as the samples. The mass collected on the filters and the mass in the probe wash are corrected by the blank measurements.

WESTON uses Class S weights during each stage of the analysis to verify the accuracy of the balance. The balance is repaired and recalibrated before proceeding if there is a significant difference in the actual mass and measured mass.

B.3 SULFUR DIOXIDE (INSTRUMENTAL)

Sulfur dioxide (SO_2) testing is conducted in accordance with EPA Reference Method 6C.

Sampling Equipment and Procedures

Figure B-2 illustrates the sampling system. The sample is withdrawn from the source through a heated probe, heated filter, and heated sample line to a sample conditioner which removes moisture from the gas stream. The sample is then transported to the analyzer through a Teflon® line.

Sample Analysis

The Bovar Western Research Model 721 ATM analyzer measures, at two discrete wavelengths, the absorption of ultraviolet radiation by the gas sample. The concentration of the components absorbing the light are then determined from relationships developed through application of the ideal gas law in concert with the laws of Bouguer, Beer, and Lambert.

Data Acquisition and Reduction

Data are acquired electronically using an IBM compatible computer and software designed by WESTON for EPA Reference Method 6C analysis. This system generates a calibration curve, converts electronic signals into concentrations, and provides bias-corrected averages.

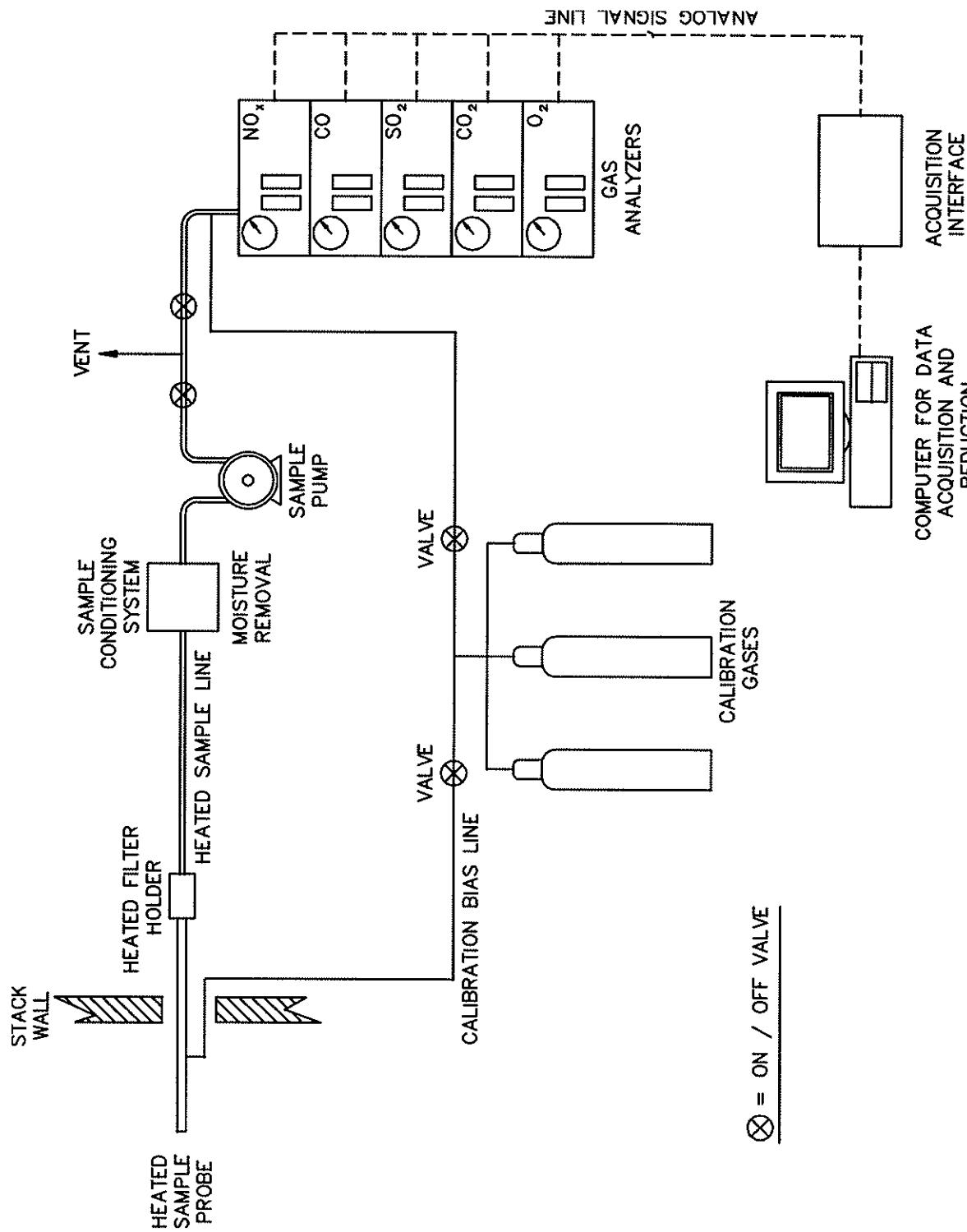


Figure B-2 EPA Reference Method 6C Sampling Train

Quality Control

At the time of analysis, SO₂ in nitrogen calibration gases (certified according to EPA Protocol-1) are used to calibrate the analyzer and to determine a bias correction factor for the entire system in accordance with EPA Reference Method 6C.

Calibration gases are introduced directly to the analyzer to generate the calibration curve. Zero level and upscale calibration gases are introduced at the probe and recovered through the sampling and analytical system. A bias correction factor is then calculated using the ratio of the measured concentration of the bias gas introduced through the sampling system and the measured concentration of the bias gas introduced directly to the analyzer. Run averages are adjusted for this bias correction factor.

B.4 NITROGEN OXIDES (INSTRUMENTAL)

Nitrogen oxides (NO_x) testing on some sources may be conducted in accordance with EPA Reference Method 7E.

Sampling Equipment and Procedures

Figure B-2 illustrates the sampling system. The sample is withdrawn from the source through a heated probe, filter, and sample line to a sample conditioner, which removes moisture from the gas stream. The sample is then transported to a California Analytical Model 400-CLD Analyzer through a Teflon® line.

Sample Analysis

The analyzer uses an oxidizing converter to produce nitric oxide (NO) molecules. A chemiluminescent reaction of NO and ozone is then used to produce nitrogen dioxide (NO₂), oxygen (O₂), and infrared light. This infrared light is measured using a highly sensitive optical filter/photomultiplier whose output is linearly proportional to the NO concentration.

Data Acquisition and Reduction

Data are acquired electronically using an IBM compatible computer and software designed by WESTON for EPA Reference Method 7E analysis. This system generates a calibration curve, converts electronic signals into concentrations, and provides bias-corrected hourly averages.

Quality Control

At the time of analysis, NO in nitrogen calibration gases, certified according to EPA Protocol-1, are used to calibrate the analyzer and to determine a bias correction factor for the entire system. Calibration and system response is performed in accordance with EPA Reference Method 7E.

Calibration gases are introduced directly to the analyzer to generate the calibration curve. A calibration gas is introduced at the probe and recovered through the sampling and analytical system. A bias correction factor is calculated using the ratio of the measured concentration of the bias gas and concentration certified by the vendor. An interference response study was performed by the manufacturer of the analyzer. The data from this study are on file at WESTON.

An NO₂ to NO conversion efficiency test is performed on site in accordance with the procedure described in either EPA Reference Method 20 or Alt. 013. The results from this study should indicate that the NO₂ to NO conversion efficiency does not drop more than 2% from the highest level or is greater than 90%, respective to the chosen method.

B.5 CARBON MONOXIDE

Carbon monoxide testing is conducted in accordance with EPA Reference Method 10.

Sampling Equipment and Procedures

Figure B-2 illustrates the sampling system. Sampling is performed by extraction of an integrated stack gas sample collected in a Tedlar® bag, or by continuous sample extraction and analysis. For both sampling procedures the sample is withdrawn from the stack, through a conditioning system for moisture removal, using a leak-tight sample pump. The dry gas sample is then collected at the outlet of the sample pump using a Tedlar® bag or transported through sample lines to the analyzer for continuous on-line monitoring.

Sample Analysis

The California Analytical Model 300 CO Non-Dispersive Infrared (NDIR) analyzer uses gas filter correlation spectroscopy to measure the amount of CO present in the sample. Infrared radiation is chopped and passed through an alternating CO and N₂ correlation filter wheel and the sample stream. Carbon monoxide in the sample absorbs the infrared radiation, leaving the remaining radiation to be measured by a detector producing a linear output signal.

Data Acquisition and Reduction

Data are acquired electronically using an IBM compatible computer and software designed by WESTON for EPA Reference Method 10 analysis or alternatively the analyzer analog signal is recorded using a strip-chart recorder.

For data collection using a computer and acquisition interface, the software generates a calibration curve and continuous calculation of sample concentration. All subsequent calculation procedures required for compliance with EPA Reference Method 10 are performed electronically.

For data collection using a strip chart recorder, the calibration curve and subsequent calibration procedures are performed manually or by using pre-programmed calculators.

Quality Control

At the time of analysis, certified CO in nitrogen calibration gases are used to calibrate the analyzer. Calibration is performed in accordance with EPA Reference Method 10.

A CO₂ interference response study was performed by the manufacturer of the analyzer. The data from this study are on file at WESTON.



APPENDIX C

FIELD DATA – NO. 3 RECOVERY FURNACE

PARTICULATE MATTER

Bowater
Catawba, South Carolina

03917.008.012
No. 3 Recovery Furnace

ISOKINETIC CALCULATIONS

Run Number		1	2	3	Mean
Date		7/24/07	7/24/07	7/24/07	---
Time Began		1141	1321	1534	---
Time Ended		1244	1436	1636	---
INPUT DATA					
Sampling Time, min	(Theta)	60.0	60	60	60
Stack Diameter, in.	(Dia.)	127.00	127.00	127.00	127.00
Barometric Pressure, in. Hg	(Pb)	29.55	29.55	29.55	29.55
Static Pressure, in. H2O	(Pg)	-0.97	-0.95	-0.91	-0.94
Pitot Tube Coefficient	(Cp)	0.84	0.84	0.84	0.84
Meter Correction Factor	(Y)	1.0090	1.0090	1.0090	1.0090
Orifice Calibration Value	(Delta H@)	1.8940	1.8940	1.8940	1.8940
Nozzle Diameter, in.	(Dn)	0.230	0.210	0.210	0.217
Meter Volume, ft^3	(Vm)	41.184	36.014	35.597	37.598
Meter Temperature, °F	(Tm)	105.7	106.9	108.5	107.0
Meter Temperature, °R	(Tm-R)	565.7	566.9	568.5	567.0
Meter Orifice Pressure, in. H2O	(Delta H)	1.586	1.150	1.133	1.290
Ave Sq Rt Orifice Press, (in. H2O)^1/2	((Delta H)^1/2)avg	1.257	1.070	1.063	1.130
Volume H2O Collected, mL	(Vlc)	322.3	262.5	227.5	270.8
CO2 Concentration, %	(CO2)	14.5	13.5	13.4	13.8
O2 Concentration, %	(O2)	5.5	5.5	5.5	5.5
Ave Sq Rt Velo Head, (in. H2O)^1/2	((Delta P)^1/2)avg	1.106	1.127	1.125	1.119
Stack Temperature, °F	(Ts)	363.3	366.6	365.6	365.2
Stack Temperature, °R	(Ts-R)	823.3	826.6	825.6	825.2
Particulate Collected, g	(Mn)	0.0572	0.0384	0.0309	0.0422
Production Rate, tons ADTP/hr	(Pr)	48	48	47	48
CALCULATED DATA					
Nozzle Area, ft^2	(An)	2.89E-04	2.41E-04	2.41E-04	2.56E-04
Stack Area, ft^2	(As)	87.97	87.97	87.97	87.97
Stack Pressure, in. Hg	(Ps)	29.48	29.48	29.48	29.48
Meter Pressure, in. Hg	(Pm)	29.67	29.63	29.63	29.64
Standard Meter Volume, ft^3	(Vmstd)	38.441	33.508	33.026	34.992
Standard Water Volume, ft^3	(Vwstd)	15.171	12.356	10.708	12.745
Moisture Fraction (Measured)	(BWS)	0.283	0.269	0.245	0.266
Moisture Fraction (lower sat/meas)	(BWS)	0.283	0.269	0.245	0.266
Mol. Wt. of Dry Gas, lb/lb-mole	(Md)	30.54	30.38	30.36	30.43
Mol. Wt. of Stack Gas, lb/lb-mole	(Ms)	26.99	27.04	27.34	27.12
Average Stack Gas Velocity, ft/sec	(Vs)	80.79	82.41	81.77	81.65
Stack Gas Flow, actual, ft^3/min	(Qa)	426429	434956	431578	430988
Stack Gas Flow, Std., ft^3/min	(Qs)	193122	199920	205302	199448
Isokinetic Sampling Rate, %	(%I)	101.2	102.2	98.1	100.5
Particulate Cone @ Std Cond, gr/ft^3	(Cs)	0.0230	0.0177	0.0144	0.0184
Particulate Cone @ 8 or 10% O2, gr/ft^3	8 (Cs@8 or 10%O2)	0.0193	0.0148	0.0121	0.0154
Particulate Emission, lb/hr	(PMR)	38.0	30.3	25.4	31.2
Particulate Emission Rate, lb/ton ADTP	(ER)	0.7917	0.6312	0.5404	0.6544
Calibration check	(Yqa)	1.0113	0.9886	0.9953	0.998
Percent difference from Y					-1.05%

CZ 9173

ISOKINETIC FIELD DATA SHEET

Method 5

B25517304512

Client	W.O.#	Project ID	Model/Source ID	Samp. Loc. ID	Run No./ID	Test Method ID	Date ID	Source/Location	Sample Date	Baro. Press (in Hg)	Operator	Ambient Temp (°F)	Total Traverse Pts	Stack Conditions	Assumed	Actual	Meter Box ID	Meter Box Y	Leak Checks	Initial	Mid-Point	Final
												11.44	508	27	3.59	1.2	529.5	3.55	(22)	25.2	25.3	25.3
														0	3.59	1.2	351.2	3.51	(22)	25.1	25.1	25.1
														1	3.55	1.2	352.5	3.52	(22)	25.1	25.1	25.1
														2	3.52	1.2	353.5	3.53	(22)	25.1	25.1	25.1
														3	3.52	1.2	354.5	3.54	(22)	25.1	25.1	25.1
														4	3.52	1.2	354.9	3.54	(22)	25.1	25.1	25.1
														5	3.52	1.2	355.2	3.55	(22)	25.1	25.1	25.1
														6	3.52	1.2	355.9	3.55	(22)	25.1	25.1	25.1
														7	3.52	1.2	357.7	3.57	(22)	25.1	25.1	25.1
														8	3.52	1.2	357.8	3.57	(22)	25.1	25.1	25.1
														9	3.52	1.2	358.0	3.58	(22)	25.1	25.1	25.1
														10	3.52	1.2	358.2	3.58	(22)	25.1	25.1	25.1
														11	3.52	1.2	358.3	3.58	(22)	25.1	25.1	25.1
														12	3.52	1.2	358.4	3.58	(22)	25.1	25.1	25.1
														13	3.52	1.2	358.5	3.58	(22)	25.1	25.1	25.1
														14	3.52	1.2	358.6	3.58	(22)	25.1	25.1	25.1
														15	3.52	1.2	358.7	3.58	(22)	25.1	25.1	25.1
														16	3.52	1.2	358.8	3.58	(22)	25.1	25.1	25.1
														17	3.52	1.2	358.9	3.58	(22)	25.1	25.1	25.1
														18	3.52	1.2	359.0	3.59	(22)	25.1	25.1	25.1
														19	3.52	1.2	359.1	3.59	(22)	25.1	25.1	25.1
														20	3.52	1.2	359.2	3.59	(22)	25.1	25.1	25.1
														21	3.52	1.2	359.3	3.59	(22)	25.1	25.1	25.1
														22	3.52	1.2	359.4	3.59	(22)	25.1	25.1	25.1
														23	3.52	1.2	359.5	3.59	(22)	25.1	25.1	25.1
														24	3.52	1.2	359.6	3.59	(22)	25.1	25.1	25.1
														25	3.52	1.2	359.7	3.59	(22)	25.1	25.1	25.1
														26	3.52	1.2	359.8	3.59	(22)	25.1	25.1	25.1
														27	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														28	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														29	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														30	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														31	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														32	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														33	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														34	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														35	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														36	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														37	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														38	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														39	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														40	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														41	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														42	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														43	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														44	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														45	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														46	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														47	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														48	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														49	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														50	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														51	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														52	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														53	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														54	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														55	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														56	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														57	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														58	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														59	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														60	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														61	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														62	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														63	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														64	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														65	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														66	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														67	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														68	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														69	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														70	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														71	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														72	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														73	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														74	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														75	3.52	1.2	359.9	3.59	(22)	25.1	25.1	25.1
														76	3.52	1.2	359.9	3.59				

ISOKINETIC FIELD DATA SHEET

B2000
83117-28.012

Stack Conditions

Method

5

K Factor

54

Page 1 of 1

W.O.#	Project ID	Model/Source ID	Samp. Loc. ID	Run No.ID	Test Method ID	Date ID	Source/Location	Sample Date	Baro. Press (in Hg)	Ambient Temp (°F)	Total Traverse Pts	Stack Conditions Assumed	Actual	Meter Box ID	Meter Box Y	Meter Box Del H	Probe ID / Length	Probe Material	Pilot / Thermocouple ID	Pilot Coefficient	Nozzle ID	Avg Nozzle Dia (in)	Area of Stack (ft ²)	Static Press (in H ₂ O)	Temperature (°F)	O2, % by Vol	CO ₂ , % by Vol	Silica gel (g)	Impinger Vol (ml)	% Moisture	Client		
83117-28.012	-	-	-	-	-	-	-	-	1.355	63	321	0	1.4	93	972.0	350	150	240	241	4	97	239	-	-	-	-	-	-	-	-	-	-	
												A1	2.5	1.2	974.1	345	17	241	242	4	97	241											
												2	2.5	1.3	975.0	346	150	240	240	4	94	244											
												3	1.9	1.2	977.0	347.0	150	240	240	5	98	245											
												4	1.2	1.2	978.5	370	150	241	241	5	95	245											
												5	12.2	1.2	978.5	371	150	242	242	5	95	245											
												6	15.0	1.1	978.8	373	150	243	243	5	95	245											
												7	2.5	1.1	981.3	375	150	244	244	9	95	250											
												8	2.5	1.5	983.4	382	150	245	245	7	95	255											
												9	22.5	1.5	984.9	384	150	246	246	7	95	255											
												10	22.5	1.5	985.1	385	150	247	247	7	95	255											
												11	23.5	1.5	987.5	390	150	248	248	9	95	260											
												12	30.0	1.7	989.3	392	150	249	249	7	95	262											
												13	32.5	1.3	991.2	395	150	250	250	9	95	264											
												14	32.5	1.2	991.2	395	150	251	251	9	95	264											
												15	33.5	1.2	992.5	397	150	252	252	9	95	265											
												16	33.5	1.3	993.9	398	150	253	253	9	95	265											
												17	33.5	1.3	995.0	399	150	254	254	9	95	265											
												18	32.5	1.2	996.2	397	150	255	255	9	95	265											
												19	45.0	1.2	998.7	398	150	256	256	9	95	266											
												20	45.0	1.3	998.7	399	150	257	257	9	95	266											
												21	43.5	1.2	999.4	400	150	258	258	9	95	267											
												22	43.5	1.2	999.4	401	150	259	259	9	95	267											
												23	43.5	1.2	999.4	402	150	260	260	9	95	267											
												24	43.5	1.2	999.4	403	150	261	261	9	95	267											
												25	43.5	1.2	999.4	404	150	262	262	9	95	267											
												26	43.5	1.2	999.4	405	150	263	263	9	95	267											
												27	43.5	1.2	999.4	406	150	264	264	9	95	267											
												28	43.5	1.2	999.4	407	150	265	265	9	95	267											
												29	43.5	1.2	999.4	408	150	266	266	9	95	267											
												30	43.5	1.2	999.4	409	150	267	267	9	95	267											
												31	43.5	1.2	999.4	410	150	268	268	9	95	267											
												32	43.5	1.2	999.4	411	150	269	269	9	95	267											
												33	43.5	1.2	999.4	412	150	270	270	9	95	267											
												34	43.5	1.2	999.4	413	150	271	271	9	95	267											
												35	43.5	1.2	999.4	414	150	272	272	9	95	267											
												36	43.5	1.2	999.4	415	150	273	273	9	95	267											
												37	43.5	1.2	999.4	416	150	274	274	9	95	267											
												38	43.5	1.2	999.4	417	150	275	275	9	95	267											
												39	43.5	1.2	999.4	418	150	276	276	9	95	267											
												40	43.5	1.2	999.4	419	150	277	277	9	95	267											
												41	43.5	1.2	999.4	420	150	278	278	9	95	267											
												42	43.5	1.2	999.4	421	150	279	279	9	95	267											
												43	43.5	1.2	999.4	422	150	280	280	9	95	267											
												44	43.5	1.2	999.4	423	150	281	281	9	95	267											
												45	43.5	1.2	999.4	424	150	282	282	9	95	267											
												46	43.5	1.2	999.4	425	150	283	283	9	95	267											
												47	43.5	1.2	999.4	426	150	284	284	9	95	267											
												48	43.5	1.2	999.4	427	150	285	285	9	95	267											
												49	43.5	1.2	999.4	428	150	286	286	9	95	267											
												50	43.5	1.2	999.4	429	150	287	287	9	95	267											
												51	43.5	1.2	999.4	430	150	288	288	9	95	267											
												52	43.5	1.2	999.4	431	150	289	289	9	95	267											
												53	43.5	1.2	999.4	432	150	290	290	9	95	267											
												54	43.5	1.2	999.4	433	150	291	291	9	95	267											
												55	43.5	1.2	999.4	434	150	292	292	9	95	267				</							

SAMPLE RECOVERY FIELD DATA

Method _____

Client Brewster
Location/Plant Sabawba, SC.

W.O. # 03917-002-002
Source No. 3 Recovery

Run No.	<u>1</u>	Sample Date	<u>7-24-07</u>	Recovery Date	<u>7-24-07</u>				
Sample I.D.		Analyst	<u>BR</u>	Filter Number	<u>CZ9173</u>				
Impinger									
Contents	1	2	3	4	5	6	Imp.Total	7	Total
Final	399	110	0					329.4	
Initial	155	100	0					316.1	
Gain	244	10	0				309	13.3	322.3
Impinger Color	<u>Blue</u>			Labeled?	<u>✓</u>				
Silica Gel Condition	<u>Spent</u>			Sealed?	<u>✓</u>				

Run No.	<u>2</u>	Sample Date	<u>7-24-07</u>	Recovery Date	<u>7-24-07</u>				
Sample I.D.		Analyst	<u>BR</u>	Filter Number	<u>CZ9174</u>				
Impinger									
Contents	1	2	3	4	5	6	Imp.Total	7	Total
Final	350	104	0					335.9	
Initial	152	121	0					323.4	
Gain	250	6	0				254	6.5	322.3
Impinger Color	<u>Pink</u>			Labeled?	<u>✓</u>				
Silica Gel Condition	<u>Spent</u>			Sealed?	<u>✓</u>				

Run No.	<u>3</u>	Sample Date	<u>7-24-07</u>	Recovery Date	<u>7-24-07</u>				
Sample I.D.		Analyst	<u>BR</u>	Filter Number	<u>CZ9175</u>				
Impinger									
Contents	1	2	3	4	5	6	Imp.Total	7	Total
Final	314	104	0					323.3	
Initial	122	102	0					318.9	
Gain	214	4	0				218	9.5	322.3
Impinger Color	<u>Blue</u>			Labeled?	<u>✓</u>				
Silica Gel Condition	<u>Spent</u>			Sealed?	<u>✓</u>				

Check COC for Sample IDs of Blank Trains and/or Media Blanks

WESTON
MANUFACTURERS
OF DUST COLLECTORS

JRW

Determination of Stack Gas Velocity - Method 2

Client	<u>Bonne Terre</u>	Operator	<u>321/LW</u>	Pitot Coeff (Cp)	<u>.42</u>
Location/Plant	<u>Columbia, Sc</u>	Date	<u>7/24/97</u>	Stack Area, ft ² (As)	<u>87.97</u>
Source	<u>3 Recovery</u>	W.O. Number	<u>53917-502612</u>		
Run Number	<u>Prelim</u>				
Time	<u>1128</u>				
Barometric Press, in Hg (Pb)	<u>29.53</u>				
Static Press, in H ₂ O (Pstatic)	<u>- .91</u>				
Source Moisture, % (BWS)					
O ₂ , %	<u>5.5</u>				
CO ₂ , %	<u>1.1</u>				

Cyclonic Flow Determination		Traverse Location		Leak Check good ? Y / N		Leak Check good ? Y / N		Leak Check good ? Y / N									
Delta P at 0°	Angle yielding zero Delta P	Port	Point	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)	Delta P	Source Temp, F° (Ts)								
			1	1.40	350												
			2	1.2	350												
			3	1.2	353												
			4	1.2	354												
			5	1.3	362												
			6	1.2	361												
			7	1.1	362												
			8	1.5	363												
			9	1.6	366												
			10	1.5	370												
			11	1.4	365												
			12	1.1	362												
Avg Angle		Avg Delta P & Temp		1.308	365.2												
		avg √DeltaP		1.1417													
Average gas stream velocity, ft/sec.																	
Vol. flow rate @ actual conditions, wacf/min																	
Vol. flow rate at standard conditions, dscf/min																	

$$MW_d = (0.32 \cdot O_2) + (0.44 \cdot CO_2) + (0.28 \cdot (100 - (CO_2 + O_2)))$$

$$MW_s = (MW_d \cdot (1 - (BWS/100))) + (18 \cdot (BWS/100))$$

$$T_{sa} = Ts + 460$$

$$Ps = Pb + (P_{static}/13.6)$$

$$Vs = 85.49 \cdot Cp \cdot \text{avg } \sqrt{\Delta P} \cdot \sqrt{T_{sa}/(Ps \cdot MW_s)}$$

$$Qs(\text{act}) = 60 \cdot Vs \cdot As$$

$$Qs(\text{std}) = 17.64 \cdot (1 - (BWS/100)) \cdot (Ps/T_{sa}) \cdot Qs(\text{act})$$

Comments _____

where:

MW_d = Dry molecular weight source gas, lb/b-mole.

MW_s = Wet molecular weight source gas, lb/b-mole.

T_{sa} = Source Temperature, absolute(oR)

P_s = Absolute stack static pressure, inches Hg.

V_s = Average gas stream velocity, ft/sec.

Q_s(act) = Volumetric flow rate of wet stack gas at actual,

Q_s(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min



Sample and Velocity Traverse Point Data Sheet - Method 1

Client Bessemer
 Location/Plant Catawba, SC
 Source #7 Rec. outlet

Operator MS
 Date 8-15-65
 W.O. Number 03917.608.003

Duct Type	<input checked="" type="checkbox"/> Circular	<input type="checkbox"/> Rectangular Duct	Indicate appropriate type
Traverse Type	<input checked="" type="checkbox"/> Particulate Traverse	<input type="checkbox"/> Velocity Traverse	

Distance from far wall to outside of port (in.) = C	139
Port Depth (in.) = D	12
Depth of Duct, diameter (in.) = C-D	127
Area of Duct (ft ²)	87.97
Total Traverse Points	24
Total Traverse Points per Port	12

Rectangular Ducts Only

Width of Duct, rectangular duct only (in.)

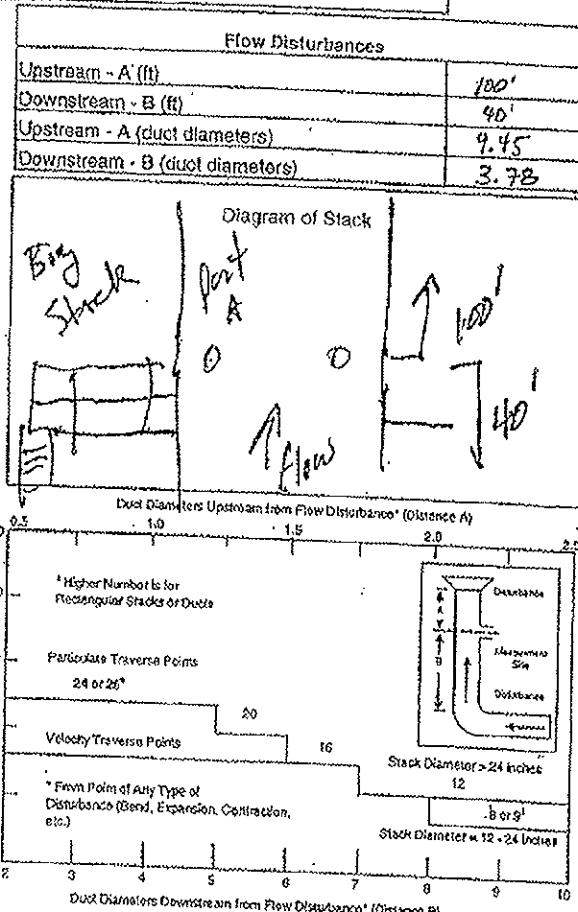
Total Ports (rectangular duct only)

Traverse Point Locations

Traverse Point	% of Duct	Distance from Inside Duct Wall (in.)	Distance from Outside of Port (in.)
1	2.1	2.8	14.5
2	6.7	8.5	20.5
3	11.8	15	27
4	17.7	22.5	34.5
5	25.0	32	44
6	35.4	45	57
7	44.4	52	64
8	75.0	95.5	107.5
9	82.3	104.5	116.5
10	88.2	112	124
11	93.3	118.5	130.5
12	97.9	124.5	136.5

Equivalent Diameter = $(2L \cdot W) / (L + W)$

Traverse Point Location Percent of Stack-Circular												
Number of Traverse Points												
1	2	3	4	5	6	7	8	9	10	11	12	13
1	14.6	6.7	4.4	3.2	2.6	2.1	1.7	1.3	1.0	0.7	0.5	0.3
2	28.9	13.9	8.9	6.2	4.6	3.4	2.5	1.9	1.4	1.0	0.7	0.4
3	35.7	17.8	11.8	8.2	5.8	4.1	2.9	2.0	1.4	1.0	0.7	0.4
4	44.4	21.7	14.6	10.0	6.7	4.7	3.3	2.3	1.6	1.1	0.8	0.5
5	54.0	26.7	17.8	12.5	8.3	5.6	3.9	2.7	1.8	1.2	0.9	0.6
6	64.5	31.6	21.4	15.2	10.0	6.7	4.6	3.1	2.0	1.3	0.9	0.6
7	75.0	36.5	24.2	17.8	12.5	8.3	5.6	3.9	2.7	1.8	1.2	0.8
8	85.4	41.4	27.4	20.0	13.3	9.0	6.0	4.0	2.7	1.8	1.2	0.8
9	95.9	46.3	31.2	23.8	16.7	11.3	7.7	5.3	3.5	2.3	1.5	1.0
10	106.3	51.2	34.0	26.7	19.4	13.3	9.0	6.0	4.0	2.7	1.8	1.2
11	116.8	56.1	36.8	29.5	22.3	15.3	10.7	7.3	4.7	3.1	2.0	1.3
12	127.3	61.0	40.0	32.7	25.5	18.3	12.7	8.7	5.7	3.7	2.4	1.6
13	137.7	65.9	42.8	35.5	28.3	21.3	15.3	10.7	7.3	4.7	3.1	2.0



Traverse Point Location Percent of Stack-Horizontal												
Number of Traverse Points												
1	2	3	4	5	6	7	8	9	10	11	12	13
1	25.0	16.7	12.5	10.0	6.7	7.1	6.7	5.6	5.0	4.5	4.2	
2	35.7	21.4	15.3	10.0	6.7	9.0	6.7	5.6	5.0	4.5	4.2	
3	46.4	26.7	19.4	14.6	11.8							
4	57.1	31.2	23.8	17.8	12.5	11.3	7.7	5.7	4.0	2.7	1.8	
5	67.8	36.5	27.4	20.0	15.2	13.3	9.0	6.0	4.0	2.7	1.8	
6	78.5	41.4	34.0	26.7	22.3	18.3	12.7	8.7	5.7	3.7	2.4	
7	89.2	46.3	38.2	31.2	25.5	21.3	15.3	10.7	7.3	4.7	3.1	
8	99.9	51.2	42.8	35.5	28.3	24.3	18.3	12.7	8.7	5.7	3.7	
9	110.6	56.1	46.3	38.2	31.2	25.5	21.3	15.3	10.7	7.3	4.7	
10	121.3	61.0	51.2	42.8	35.5	31.2	24.3	18.3	12.7	8.7	5.7	
11	132.0	65.9	56.1	46.3	38.2	34.0	27.4	21.3	15.3	10.7	7.3	
12	142.7	69.8	60.0	51.2	42.8	38.2	31.2	24.3	18.3	12.7	8.7	
13	153.4	73.7	64.9	56.1	46.3	42.8	34.0	27.4	21.3	15.3	10.7	

Rectangular Stack Points
 8 Matrix
 9 - 3 x 3
 12 - 4 x 3
 16 - 4 x 4
 20 - 5 x 4
 25 - 5 x 5
 30 - 6 x 5
 36 - 6 x 6
 42 - 7 x 6
 49 - 7 x 7

WESTON
 UNIVAC INC.

**NITROGEN OXIDES, SULFUR DIOXIDE,
AND CARBON MONOXIDE**

Bowater
Catawba, South Carolina

03917.008.012
No. 3 Recovery Furnace

EMISSION CALCULATIONS

	Run 1	Run 2	Run 3	Mean
Date	7/24/07	7/24/07	7/24/07	---
Time Began	1141	1324	1533	---
Time Ended	1244	1427	1636	---
Volumetric Flow Rate, (Qs), DSCFM	1.93E+05	2.00E+05	2.05E+05	1.99E+05
BWS	0.283	0.269	0.245	0.266
% Oxygen	5.5	5.5	5.5	5.5
Oxygen Reference Concentration, %	8.0	8.0	8.0	8.0
Production Rate, units/hr ton ADTP	48	48	47	48

Nitrogen Oxides	MW= 46.01						
Concentration, ppm		62.0	63.0	65.0	63.3		
Concentration, ppm @8%O2		51.9	52.8	54.4	53.1		
Emission Rate, lb/hr		85.8	90.2	95.6	90.5		
Emission Factor, lb/ton ADTP		1.79	1.88	2.03	1.90		

Sulfur Dioxide	MW= 64.06						
Concentration, ppm	<	1.0	<	1.0	<	1.0	< 1.0
Concentration, ppm @8%O2	<	0.8	<	0.8	<	0.8	< 0.8
Emission Rate, lb/hr	<	1.9	<	2.0	<	2.0	< 2.0
Emission Factor, lb/ton ADTP	<	0.04	<	0.04	<	0.04	< 0.04

Carbon Monoxide	MW= 28.00						
Concentration, ppm		247.0	180.0	167.0	198.0		
Concentration, ppm @8%O2		206.9	150.8	139.9	165.9		
Emission Rate, lb/hr		207.9	156.9	149.5	171.4		
Emission Factor, lb/ton ADTP		4.33	3.27	3.18	3.59		

/N/A

RUN SUMMARY

Number 1

Client: **Bowater** Project Number: **03917.008.012**
Location: **Catawba, S.C.** Operator: **Simpkins**
Source: **No.3 Recovery** Date: **24 Jul 2007**
Calibration: **1**

Analyzer	O2	CO2	CO	NOx	SO2
Method	EPA 3A	EPA 3A	EPA 10	EPA 7E	EPA 6C
Conc. Units	%	%	ppm	ppm	ppm

Time: 11:41 to 12:02

Run Averages

5.7 ✓ 14.4 ✓ 286 ✓ 59 ✓ -0.7 ✓

Pre-run Bias at 11:01

Zero Bias	0.1	-0.2	2	0	0.1
Span Bias	9.9	9.9	433	119	43.1
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 12:47

Zero Bias	0.1	-0.2	3	1	-0.5
Span Bias	9.9	9.9	436	119	42.8
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.7 ✓ 14.3 ✓ 298 ✓ 61 ✓ 0.0 ✓
~0.5
Avg. Run 1-3 → 5.5 14.5 297 62 0.0

✓ SW

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RUN SUMMARY

Number 2

Client: Bowater
Location: Catawba, S.C.
Source: No.3 Recovery
Calibration: 1

Project Number: 03917.008.012
Operator: Simpkins
Date: 24 Jul 2007

Analyzer	O2	CO2	CO	NOx	SO2
Method	EPA 3A	EPA 3A	EPA 10	EPA 7E	EPA 6C
Conc. Units	%	%	ppm	ppm	ppm

Time: 12:02 to 12:23

Run Averages

5.4 ✓ 14.7 ✓ 154 ✓ 61 ✓ -0.6 ✓

Pre-run Bias at 11:01

Zero Bias	0.1	-0.2	2	0	0.1
Span Bias	9.9	9.9	433	119	43.1
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 12:47

Zero Bias	0.1	-0.2	3	1	-0.5
Span Bias	9.9	9.9	436	119	42.8
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.4 14.6 159 63 0.0



RUN SUMMARY

Number 3

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**
Calibration: **1**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Analyzer	O2	CO2	CO	NOx	SO2
Method	EPA 3A	EPA 3A	EPA 10	EPA 7E	EPA 6C
Conc. Units	%	%	ppm	ppm	ppm

Time: 12:23 to 12:44

Run Averages

5.5 ✓ 14.8 ✓ 272 ✓ 61 ✓ -0.5 ✓

Pre-run Bias at 11:01

Zero Bias	0.1	-0.2	2	0	0.1
Span Bias	9.9	9.9	433	119	43.1
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 12:47

Zero Bias	0.1	-0.2	3	1	-0.5
Span Bias	9.9	9.9	436	119	42.8
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.5 ✓ 14.7 ✓ 283 ✓ 63 ✓ 0.0

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RUN SUMMARY

Number 4

Client: **Bowater** Project Number: **03917.008.012**
Location: **Catawba, S.C.** Operator: **Simpkins**
Source: **No.3 Recovery** Date: **24 Jul 2007**
Calibration: **1**

Analyzer	O2	CO2	CO	NOx	SO2
Method	EPA 3A	EPA 3A	EPA 10	EPA 7E	EPA 6C
Conc. Units	%	%	ppm	ppm	ppm

Time: **13:24 to 13:45**

Run Averages

5.5 ✓ 13.7 ✓ 155 ✓ 62 ✓ -0.1 ✓

Pre-run Bias at 12:47

Zero Bias	0.1	-0.2	3	1	-0.5
Span Bias	9.9	9.9	436	119	42.8
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 14:28

Zero Bias	0.1	-0.4	3	0	0.0
Span Bias	9.9	10.0	436	119	43.0
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.5 13.5 160 64 0.2

Average Runs 4 & 6 → 5.5 13.5 160 63 0.2

RUN SUMMARY

Number 5

Client: **Bowater** Project Number: **03917.008.012**
Location: **Catawba, S.C.** Operator: **Simpkins**
Source: **No.3 Recovery** Date: **24 Jul 2007**
Calibration: **1**

Analyzer	O2	CO2	CO	NOx	SO2
Method	EPA 3A	EPA 3A	EPA 10	EPA 7E	EPA 6C
Conc. Units	%	%	ppm	ppm	ppm

Time: **13:45 to 14:06**

Run Averages

5.6 ✓ 13.7 ✓ 203 ✓ 61 ✓ 0.0 ✓

Pre-run Bias at 12:47

Zero Bias	0.1	-0.2	3	1	-0.5
Span Bias	9.9	9.9	436	119	42.8
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 14:28

Zero Bias	0.1	-0.4	3	0	0.0
Span Bias	9.9	10.0	436	119	43.0
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.6 13.5 210 63 0.3

RUN SUMMARY

Number 6

Client: **Bowater** Project Number: **03917.008.012**
Location: **Catawba, S.C.** Operator: **Simpkins**
Source: **No.3 Recovery** Date: **24 Jul 2007**
Calibration: **1**

Analyzer	O2	CO2	CO	NOx	SO2
Method	EPA 3A	EPA 3A	EPA 10	EPA 7E	EPA 6C
Conc. Units	%	%	ppm	ppm	ppm

Time: 14:06 to 14:27

Run Averages

5.5 ✓ 13.7✓ 166✓ 61✓ -0.2 ✓

Pre-run Bias at 12:47

Zero Bias	0.1	-0.2	3	1	-0.5
Span Bias	9.9	9.9	436	119	42.8
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 14:28

Zero Bias	0.1	-0.4	3	0	0.0
Span Bias	9.9	10.0	436	119	43.0
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.5 ✓ 13.5✓ 171✓ 63✓ 0.1

(JSW)

RUN SUMMARY

Number 7

Client: **Bowater** Project Number: **03917.008.012**
Location: **Catawba, S.C.** Operator: **Simpkins**
Source: **No.3 Recovery** Date: **24 Jul 2007**
Calibration: **1**

Analyzer	O2	CO2	CO	NOx	SO2
Method	EPA 3A	EPA 3A	EPA 10	EPA 7E	EPA 6C
Conc. Units	%	%	ppm	ppm	ppm

Time: 15:33 to 15:54

Run Averages

5.6 ✓ 13.8 ✓ 198 ✓ 63 ✓ -0.2 ✓

Pre-run Bias at 14:28

Zero Bias	0.1	-0.4	3	0	0.0
Span Bias	9.9	10.0	436	119	43.0
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 16:37

Zero Bias	0.1	-0.3	3	0	0.0
Span Bias	9.9	10.0	436	120	43.0
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.6 13.5 205 65 0.0

Average Runns 7-9 → 5.6 13.4 167 65 0.0

RUN SUMMARY

Number 8

Client: **Bowater** Project Number: **03917.008.012**
Location: **Catawba, S.C.** Operator: **Simpkins**
Source: **No.3 Recovery** Date: **24 Jul 2007**
Calibration: **1**

Analyzer Method	O2 EPA 3A Conc. Units	CO2 EPA 3A %	CO EPA 10 ppm	NOx EPA 7E ppm	SO2 EPA 6C ppm
--------------------	-----------------------------	--------------------	---------------------	----------------------	----------------------

Time: 15:54 to 16:15

Run Averages

5.5 ✓ 13.5 ✓ 127 ✓ 63 ✓ -0.2 ✓

Pre-run Bias at 14:28

Zero Bias	0.1	-0.4	3	0	0.0
Span Bias	9.9	10.0	436	119	43.0
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 16:37

Zero Bias	0.1	-0.3	3	0	0.0
Span Bias	9.9	10.0	436	120	43.0
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.5 13.2 130 65 0.0

RUN SUMMARY

Number 9

Client: **Bowater** Project Number: **03917.008.012**
Location: **Catawba, S.C.** Operator: **Simpkins**
Source: **No.3 Recovery** Date: **24 Jul 2007**
Calibration: **1**

Analyzer Method	O2 EPA 3A Conc. Units	CO2 EPA 3A %	CO EPA 10 ppm	NOx EPA 7E ppm	SO2 EPA 6C ppm
--------------------	-----------------------------	--------------------	---------------------	----------------------	----------------------

Time: 16:15 to 16:36

Run Averages

5.4 ✓ 13.8 ✓ 160 ✓ 62 ✓ -0.1 ✓

Pre-run Bias at 14:28

Zero Bias	0.1	-0.4	3	0	0.0
Span Bias	9.9	10.0	436	119	43.0
Span Gas	10.0	9.9	454	124	45.5

Post-run Bias at 16:37

Zero Bias	0.1	-0.3	3	0	0.0
Span Bias	9.9	10.0	436	120	43.0
Span Gas	10.0	9.9	454	124	45.5

Run averages corrected for the average of the pre-run and post-run bias

5.4 ✓ 13.5 ✓ 165 ✓ 64 ✓ 0.0



RUN DATA

Number 1

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 11:41										
11:42	2287	5.5	5752	14.6	2525	255	2096	60	-46	0.0
11:43	2243	5.4	5562	14.1	2582	260	2078	59	-46	0.0
11:44	2271	5.5	5508	13.9	3099	312	2068	59	-51	0.0
11:45	2288	5.5	5957	15.1	3265	329	2025	58	-46	0.0
11:46	2339	5.7	5897	14.9	3336	336	2027	58	-50	0.0
11:47	2290	5.5	5971	15.1	2914	294	2058	59	-48	0.0
11:48	2325	5.6	5971	15.1	2658	268	2075	59	-50	0.0
11:49	2320	5.6	5674	14.4	2528	255	2056	59	-44	0.0
11:50	2317	5.6	5700	14.4	3381	341	2077	59	-46	0.0
11:51	2354	5.7	5667	14.4	2134	215	2047	58	-43	0.0
11:52	2357	5.7	5665	14.3	2768	279	2032	58	-41	0.0
11:53	2310	5.6	5718	14.5	2683	270	2056	59	-42	0.0
11:54	2397	5.8	5659	14.3	1991	201	2069	59	-35	0.0
11:55	2297	5.6	5535	14.0	2044	206	2081	59	-31	0.0
11:56	2432	5.9	5551	14.1	1659	168	2095	60	-36	0.0
11:57	2390	5.8	5574	14.1	2392	241	2087	60	-36	0.0
11:58	2383	5.8	5651	14.3	3268	329	2071	59	-31	0.0
11:59	2340	5.7	5780	14.6	2105	212	2058	59	-27	0.0
12:00	2356	5.7	5398	13.7	3807	383	2054	59	-39	0.0
12:01	2432	5.9	5603	14.2	4493	452	2085	60	-34	0.0
12:02	2451	5.9	5641	14.3	3897	392	2057	59	-40	0.0
Run Avg	2342	5.7	5687	14.4	2835	286	2064	59	-41	-0.7

RUN DATA

Number 2

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 12:02										
12:03	2362	5.7	5698	14.4	2633	265	2047	58	-31	0.0
12:04	2320	5.6	5818	14.7	1861	188	2084	60	-32	0.0
12:05	2240	5.4	5903	15.0	2709	273	2061	59	-24	0.0
12:06	2236	5.4	5805	14.7	2619	264	2146	61	-19	0.0
12:07	2262	5.5	5676	14.4	1280	129	2158	62	-34	0.0
12:08	2207	5.3	5802	14.7	1763	178	2126	61	-33	0.0
12:09	2284	5.5	5562	14.1	2595	262	2115	60	-24	0.0
12:10	2336	5.7	5534	14.0	1269	128	2101	60	-31	0.0
12:11	2269	5.5	5876	14.9	993	101	2191	63	-25	0.0
12:12	2266	5.5	5747	14.6	870	88	2164	62	-31	0.0
12:13	2305	5.6	5558	14.1	836	85	2138	61	-29	0.0
12:14	2223	5.4	5793	14.7	1254	127	2145	61	-25	0.0
12:15	2273	5.5	5762	14.6	1062	108	2149	61	-31	0.0
12:16	2196	5.3	5747	14.6	1309	132	2122	61	-20	0.0
12:17	2211	5.3	6048	15.3	1822	184	2094	60	-24	0.0
12:18	2244	5.4	5730	14.5	1358	137	2117	60	-21	0.0
12:19	2258	5.5	5788	14.7	929	94	2167	62	-19	0.0
12:20	2205	5.3	5742	14.5	1110	112	2157	62	-17	0.0
12:21	2159	5.2	6133	15.5	1336	135	2129	61	-29	0.0
12:22	2193	5.3	5995	15.2	1311	133	2114	60	-34	0.0
12:23	2228	5.4	5725	14.5	1037	105	2174	62	-21	0.0
Run Avg	2251	5.4	5783	14.7	1522	154	2129	61	-26	-0.6

RUN DATA

Number 3

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 12:23										
12:24	2105	5.1	5890	14.9	3463	349	2141	61	-18	0.0
12:25	2165	5.2	6199	15.7	3375	340	2167	62	-18	0.0
12:26	2144	5.2	6162	15.6	4245	427	2122	61	-14	0.0
12:27	2190	5.3	6161	15.6	3814	384	2067	59	-17	0.0
12:28	2135	5.2	6125	15.5	3928	395	2094	60	-21	0.0
12:29	2242	5.4	5932	15.0	2150	217	2120	61	-18	0.0
12:30	2280	5.5	5690	14.4	1503	152	2090	60	-29	0.0
12:31	2269	5.5	5701	14.4	1827	184	2142	61	-21	0.0
12:32	2186	5.3	5805	14.7	2217	224	2152	61	-22	0.0
12:33	2232	5.4	5861	14.8	1656	167	2120	61	-21	0.0
12:34	2204	5.3	5864	14.9	1583	160	2167	62	-30	0.0
12:35	2301	5.6	5782	14.6	798	81	2243	64	-18	0.0
12:36	2301	5.6	5811	14.7	1086	110	2166	62	-17	0.0
12:37	2317	5.6	5647	14.3	1805	182	2086	60	-18	0.0
12:38	2323	5.6	5730	14.5	1397	141	2116	60	-16	0.0
12:39	2309	5.6	5829	14.8	2185	220	2107	60	-15	0.0
12:40	2326	5.6	5630	14.3	6309	635	2047	58	-14	0.0
12:41	2317	5.6	5732	14.5	5083	512	2043	58	-7	0.0
12:42	2409	5.8	5594	14.2	4010	404	2096	60	-3	0.0
12:43	2421	5.9	5587	14.1	2847	287	2111	60	-11	0.0
12:44	2318	5.6	5973	15.1	1436	145	2184	62	-13	0.0
Run Avg	2262	5.5	5843	14.8	2701	272	2123	61	-17	-0.5

RUN DATA

Number 4

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 13:24										
13:25	2300	5.6	5381	13.6	572	58	2237	64	26	0.0
13:26	2248	5.4	5209	13.2	706	72	2185	62	20	0.0
13:27	2312	5.6	5278	13.4	598	61	2188	63	30	0.0
13:28	2318	5.6	5436	13.8	605	62	2176	62	26	0.0
13:29	2312	5.6	5172	13.1	556	57	2206	63	21	0.0
13:30	2198	5.3	5244	13.3	1048	106	2181	62	21	0.0
13:31	2233	5.4	5442	13.8	1971	199	2180	62	13	0.0
13:32	2283	5.5	5495	13.9	1481	150	2185	62	10	0.0
13:33	2256	5.5	5259	13.3	1608	162	2176	62	20	0.0
13:34	2253	5.4	5222	13.2	1549	156	2136	61	12	0.0
13:35	2226	5.4	5620	14.2	2440	246	2103	60	10	0.0
13:36	2230	5.4	5557	14.1	2515	254	2113	60	22	0.0
13:37	2315	5.6	5409	13.7	1732	175	2140	61	16	0.0
13:38	2242	5.4	5219	13.2	2017	203	2144	61	17	0.0
13:39	2260	5.5	5377	13.6	1593	161	2143	61	22	0.0
13:40	2258	5.5	5666	14.3	2019	204	2142	61	14	0.0
13:41	2296	5.6	5635	14.3	2043	206	2155	62	23	0.0
13:42	2287	5.5	5586	14.1	1363	138	2176	62	20	0.0
13:43	2247	5.4	5331	13.5	1915	193	2145	61	21	0.0
13:44	2268	5.5	5706	14.5	1768	178	2164	62	14	0.0
13:45	2271	5.5	5302	13.4	2028	205	2155	62	13	0.0
Run Avg	2267	5.5	5407	13.7	1530	155	2163	62	19	-0.1

RUN DATA

Number 5

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 13:45										
13:46	2289	5.5	5372	13.6	1699	172	2149	61	32	0.0
13:47	2213	5.3	5540	14.0	3538	356	2127	61	27	0.0
13:48	2328	5.6	5441	13.8	1916	193	2129	61	30	0.0
13:49	2316	5.6	5536	14.0	1933	195	2157	62	25	0.0
13:50	2315	5.6	5370	13.6	1400	142	2192	63	40	0.1
13:51	2209	5.3	5814	14.7	1910	193	2169	62	41	0.1
13:52	2290	5.5	5637	14.3	1389	140	2165	62	40	0.1
13:53	2420	5.9	5464	13.8	501	51	2234	64	42	0.1
13:54	2386	5.8	5324	13.5	1504	152	2194	63	35	0.1
13:55	2351	5.7	5429	13.7	1522	154	2139	61	32	0.0
13:56	2336	5.7	5479	13.9	1471	149	2173	62	37	0.1
13:57	2326	5.6	5474	13.9	2226	224	2141	61	36	0.1
13:58	2393	5.8	5258	13.3	3197	322	2119	61	42	0.1
13:59	2348	5.7	5522	14.0	2035	205	2001	57	31	0.0
14:00	2426	5.9	5069	12.8	3964	399	1980	56	32	0.0
14:01	2462	6.0	5025	12.7	3695	372	2015	58	34	0.0
14:02	2384	5.8	5330	13.5	3450	347	2070	59	34	0.0
14:03	2270	5.5	5427	13.7	1208	122	2140	61	39	0.1
14:04	2284	5.5	5414	13.7	1208	122	2116	60	25	0.0
14:05	2310	5.6	5395	13.7	1615	163	2155	62	15	0.0
14:06	2345	5.7	5447	13.8	862	87	2116	60	-2	0.0
Run Avg	2333	5.6	5417	13.7	2012	203	2128	61	32	0.0

RUN DATA

Number 6

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 14:06										
14:07	2230	5.4	5445	13.8	1337	135	2143	61	-19	0.0
14:08	2251	5.4	5255	13.3	968	98	2116	60	-24	0.0
14:09	2305	5.6	5471	13.9	1512	153	2130	61	-18	0.0
14:10	2335	5.6	5408	13.7	1249	126	2112	60	-8	0.0
14:11	2231	5.4	5465	13.8	1325	134	2132	61	3	0.0
14:12	2223	5.4	5341	13.5	2055	207	2123	61	1	0.0
14:13	2296	5.6	5674	14.4	2277	230	2131	61	10	0.0
14:14	2337	5.7	5165	13.1	1384	140	2165	62	12	0.0
14:15	2280	5.5	5625	14.2	934	95	2191	63	18	0.0
14:16	2234	5.4	5389	13.6	1020	103	2181	62	25	0.0
14:17	2343	5.7	5471	13.9	1224	124	2187	63	21	0.0
14:18	2353	5.7	5283	13.4	1163	118	2203	63	21	0.0
14:19	2338	5.7	5209	13.2	1421	144	2186	62	23	0.0
14:20	2247	5.4	5525	14.0	1880	190	2131	61	24	0.0
14:21	2262	5.5	5465	13.8	3382	341	2141	61	28	0.0
14:22	2295	5.5	5226	13.2	2527	255	2153	62	32	0.0
14:23	2332	5.6	5386	13.6	1062	108	2164	62	22	0.0
14:24	2249	5.4	5369	13.6	1349	136	2060	59	7	0.0
14:25	2259	5.5	5486	13.9	1263	128	2049	58	1	0.0
14:26	2202	5.3	5508	13.9	2370	239	2000	57	1	0.0
14:27	2196	5.3	5531	14.0	2765	279	2014	57	3	0.0
Run Avg	2276	5.5	5414	13.7	1641	166	2129	61	9	-0.2

RUN DATA

Number 7

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 15:33										
15:34	2332	5.6	5313	13.5	1837	185	2206	63	20	0.0
15:35	2347	5.7	5536	14.0	2246	226	2185	62	27	0.0
15:36	2328	5.6	5437	13.8	1893	191	2177	62	28	0.0
15:37	2317	5.6	5642	14.3	2823	284	2186	62	21	0.0
15:38	2327	5.6	5373	13.6	1993	201	2210	63	24	0.0
15:39	2319	5.6	5339	13.5	1164	118	2172	62	28	0.0
15:40	2309	5.6	5587	14.1	1725	174	2180	62	29	0.0
15:41	2320	5.6	5490	13.9	2233	225	2198	63	31	0.0
15:42	2288	5.5	5446	13.8	1239	125	2183	62	20	0.0
15:43	2246	5.4	5517	14.0	2852	287	2242	64	11	0.0
15:44	2271	5.5	5629	14.3	2769	279	2209	63	5	0.0
15:45	2251	5.4	5355	13.6	3715	374	2226	64	-21	0.0
15:46	2290	5.5	5451	13.8	2093	211	2201	63	-25	0.0
15:47	2273	5.5	5425	13.7	2608	263	2198	63	-35	0.0
15:48	2285	5.5	5589	14.2	2797	282	2201	63	-32	0.0
15:49	2300	5.6	5670	14.4	1720	174	2180	62	-20	0.0
15:50	2349	5.7	5289	13.4	1597	161	2254	64	-2	0.0
15:51	2393	5.8	5314	13.5	573	58	2276	65	0	0.0
15:52	2382	5.8	5514	14.0	512	52	2251	64	1	0.0
15:53	2385	5.8	5221	13.2	1656	167	2261	65	9	0.0
15:54	2323	5.6	5456	13.8	1238	125	2128	61	4	0.0
Run Avg	2316	5.6	5457	13.8	1966	198	2206	63	6	-0.2

RUN DATA

Number 8

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 15:54										
15:55	2373	5.7	5597	14.2	1849	187	2119	61	5	0.0
15:56	2406	5.8	5127	13.0	1731	175	2101	60	7	0.0
15:57	2410	5.8	5148	13.0	2251	227	2167	62	6	0.0
15:58	2392	5.8	5388	13.6	1108	112	2139	61	9	0.0
15:59	2295	5.5	5562	14.1	1172	119	2209	63	11	0.0
16:00	2274	5.5	5385	13.6	763	78	2211	63	11	0.0
16:01	2288	5.5	5564	14.1	898	91	2167	62	14	0.0
16:02	2341	5.7	5327	13.5	739	75	2200	63	14	0.0
16:03	2295	5.5	5413	13.7	799	81	2242	64	8	0.0
16:04	2293	5.5	5210	13.2	972	99	2210	63	6	0.0
16:05	2299	5.6	5451	13.8	852	86	2205	63	8	0.0
16:06	2288	5.5	5308	13.4	769	78	2201	63	11	0.0
16:07	2321	5.6	5165	13.1	1319	133	2211	63	9	0.0
16:08	2308	5.6	5167	13.1	372	38	2214	63	9	0.0
16:09	2314	5.6	5477	13.9	640	65	2195	63	8	0.0
16:10	2295	5.5	5197	13.2	928	94	2198	63	17	0.0
16:11	2264	5.5	5205	13.2	814	83	2243	64	18	0.0
16:12	2189	5.3	5258	13.3	2307	233	2224	64	15	0.0
16:13	2174	5.2	5420	13.7	1844	186	2216	63	24	0.0
16:14	2147	5.2	5325	13.5	2262	228	2216	63	15	0.0
16:15	2225	5.4	5379	13.6	1941	196	2236	64	16	0.0
Run Avg	2295	5.5	5337	13.5	1254	127	2196	63	11	-0.2

RUN DATA

Number 9

Client: **Bowater**
 Location: **Catawba, S.C.**
 Source: **No.3 Recovery**
 Calibration: **1**

Project Number: **03917.008.012**
 Operator: **Simpkins**
 Date: **24 Jul 2007**

Time	O2		CO2		CO		NOx		SO2	
	mv	%	mv	%	mv	ppm	mv	ppm	mv	ppm
Starting time 16:15										
16:16	2317	5.6	5400	13.7	827	84	2226	64	21	0.0
16:17	2222	5.4	5474	13.9	1602	162	2188	63	23	0.0
16:18	2165	5.2	5426	13.7	1081	109	2224	64	25	0.0
16:19	2174	5.2	5537	14.0	1953	197	2173	62	14	0.0
16:20	2157	5.2	5562	14.1	2116	213	2220	63	15	0.0
16:21	2205	5.3	5558	14.1	1648	166	2214	63	11	0.0
16:22	2174	5.2	5267	13.3	2043	206	2241	64	2	0.0
16:23	2190	5.3	5571	14.1	1371	139	2217	63	14	0.0
16:24	2188	5.3	5506	13.9	1840	186	2182	62	15	0.0
16:25	2190	5.3	5527	14.0	1299	131	2205	63	18	0.0
16:26	2204	5.3	5524	14.0	2186	220	2180	62	7	0.0
16:27	2218	5.4	5574	14.1	2038	206	2218	63	19	0.0
16:28	2237	5.4	5325	13.5	1631	165	2189	63	11	0.0
16:29	2351	5.7	5527	14.0	1513	153	2156	62	15	0.0
16:30	2332	5.6	5600	14.2	366	38	2280	65	20	0.0
16:31	2315	5.6	5561	14.1	298	31	2226	64	17	0.0
16:32	2256	5.5	5242	13.3	1357	137	2246	64	23	0.0
16:33	2341	5.7	5106	12.9	1239	125	2152	61	22	0.0
16:34	2318	5.6	5122	13.0	1580	160	2048	58	22	0.0
16:35	2373	5.7	5347	13.5	3076	310	1980	56	19	0.0
16:36	2395	5.8	5586	14.1	2128	215	2083	59	20	0.0
Run Avg	2253	5.4	5445	13.8	1581	160	2183	62	17	-0.1

Number 1

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 11:01

O2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results

Gas	Cal %	Bias Response mv	Bias %	Bias Error
Zero	0.0	111	0.1	0.5% ✓
Span	10.0	4063	9.9	-0.5% ✓

CO2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results

Gas	Cal %	Bias Response mv	Bias %	Bias Error
Zero	0.0	-54	-0.2	-1.0% ✓
Span	9.8	3930	9.9	0.5% ✓

CO

Method: EPA 10
Span Conc. 895 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	Bias ppm	Bias Error
Zero	5	11	2	-0.3% ✓
Span	445	4298	433	-1.3% ✓

WESTON
SOLUTIONS

Number 1

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 11:01

NOx

Method: EPA 7E
Span Conc. 250 ppm

Bias Results				
	Cal	Bias Response		Bias
Gas	ppm	mv	ppm	Error
Zero	0	42	0	0.0% ✓
Span	124	4125	119	-2.0% ✓

SO2

Method: EPA 6C
Span Conc. 89.6 ppm

Bias Results				
	Cal	Bias Response		Bias
Gas	ppm	mv	ppm	Error
Zero	0.1	45	0.1	0.0% ✓
Span	45.3	4309	43.1	-2.5% ✓

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 12:47

O2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results

Gas	Cal %	Bias Response mv	Bias Error
Zero	0.0	105	0.1 0.5% ✓
Span	10.0	4028	-0.5% -0.5% ✓

Calibration Drift

	Initial* %	Final mv	Drift %
Gas	0.1	105	0.0% 0.0% ✓
Zero	9.9	4028	0.0% 0.0% ✓
Span			

*Bias No. 1

CO2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results

Gas	Cal %	Bias Response mv	Bias Error
Zero	0.0	-79	-0.2 -1.0% ✓
Span	9.8	3902	0.5% 0.5% ✓

Calibration Drift

	Initial* %	Final mv	Drift %
Gas	-0.2	-79	0.0% 0.0% ✓
Zero	9.9	3902	0.0% 0.0% ✓
Span			

*Bias No. 1

✓S

WESTON
SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 12:47

CO

Method: EPA 10

Span Conc. 895 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	Bias ppm	Bias Error
Zero	5	21	3	-0.2% ✓
Span	445	4333	436	-1.0% ✓

Calibration Drift

Gas	Initial* ppm	Final mv	ppm	Drift
Zero	2	21	3	0.1% ✓
Span	433	4333	436	0.3% ✓

*Bias No. 1

NOx

Method: EPA 7E

Span Conc. 250 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	Bias ppm	Bias Error
Zero	0	65	1	0.4% ✓
Span	124	4120	119	-2.0% ✓

Calibration Drift

Gas	Initial* ppm	Final mv	ppm	Drift
Zero	0	65	1	0.4% ✓
Span	119	4120	119	0.0% ✓

*Bias No. 1

(JS)

WESTON
SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 2

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 12:47

SO2

Method: EPA 6C

Span Conc. 89.6 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	ppm	Bias Error
Zero	0.1	-20	-0.5	-0.7% ✓
Span	45.3	4283	42.8	-2.8% ✓

Calibration Drift

Gas	Initial* ppm	Final mv	ppm	Drift
Zero	0.1	-20	-0.5	-0.7% ✓
Span	43.1	4283	42.8	-0.3% ✓

*Bias No. 1

WESTON
SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 3

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 14:28

O2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results

Gas	Cal %	Bias Response mv	Bias Error
Zero	0.0	101	0.5% ✓
Span	10.0	4028	-0.5% ✓

Calibration Drift

	Initial* %	Final mv	Drift %
Gas	0.1	101	0.0% ✓
Zero	9.9	4028	0.0% ✓
Span			

*Bias No. 2

CO2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results

Gas	Cal %	Bias Response mv	Bias Error
Zero	0.0	-145	-2.0% ✓
Span	9.8	3946	1.0% ✓

Calibration Drift

	Initial* %	Final mv	Drift %
Gas	-0.2	-145	-1.0% ✓
Zero	9.9	3946	0.5% ✓
Span			

*Bias No. 2

✓JW

WESTON
SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 3

Client: Bowater
Location: Catawba, S.C.
Source: No.3 Recovery

Project Number: 03917.008.012
Operator: Simpkins
Date: 24 Jul 2007

Starting Time: 14:28

CO

Method: EPA 10
Span Conc. 895 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	Bias ppm	Bias Error
Zero	5	20	3	-0.2% ✓
Span	445	4331	436	-1.0% ✓

Calibration Drift

Gas	Initial* ppm	Final mv	ppm	Drift
Zero	3	20	3	0.0% ✓
Span	436	4331	436	0.0% ✓

*Bias No. 2

NOx

Method: EPA 7E
Span Conc. 250 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	Bias ppm	Bias Error
Zero	0	47	0	0.0% ✓
Span	124	4119	119	-2.0% ✓

Calibration Drift

Gas	Initial* ppm	Final mv	ppm	Drift
Zero	1	47	0	-0.4% ✓
Span	119	4119	119	0.0% ✓

*Bias No. 2



BIAS AND CALIBRATION DRIFT

Number 3

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 14:28

SO2

Method: EPA 6C

Span Conc. 89.6 ppm

Bias Results

Gas	Cal	Bias Response		Bias
	ppm	mv	ppm	Error
Zero	0.1	28	0.0	-0.1% ✓
Span	45.3	4306	43.0	-2.6% ✓

Calibration Drift

	Initial*	Final		
Gas	ppm	mv	ppm	Drift
Zero	-0.5	28	0.0	0.6% ✓
Span	42.8	4306	43.0	0.2% ✓

*Bias No. 2

WESTON
SOLUTIONS

BIAS AND CALIBRATION DRIFT

Number 4

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 16:37

O2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results			
	Cal	Bias Response	Bias
Gas	%	mv	%
Zero	0.0	118	0.1
Span	10.0	4028	9.9

Calibration Drift			
	Initial*	Final	
Gas	%	mv	%
Zero	0.1	118	0.1
Span	9.9	4028	9.9

*Bias No. 3

CO2

Method: EPA 3A
Span Conc. 19.9 %

Bias Results			
	Cal	Bias Response	Bias
Gas	%	mv	%
Zero	0.0	-104	-0.3
Span	9.8	3964	10.0

Calibration Drift			
	Initial*	Final	
Gas	%	mv	%
Zero	-0.4	-104	-0.3
Span	10.0	3964	10.0

*Bias No. 3



BIAS AND CALIBRATION DRIFT

Number 4

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 16:37

CO

Method: EPA 10

Span Conc. 895 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	Bias ppm	Bias Error
Zero	5	24	3	-0.2% ✓
Span	445	4331	436	-1.0% ✓

Calibration Drift

Gas	Initial*		Final	
	ppm	mv	ppm	Drift
Zero	3	24	3	0.0% ✓
Span	436	4331	436	0.0% ✓

*Bias No. 3

NOx

Method: EPA 7E

Span Conc. 250 ppm

Bias Results

Gas	Cal ppm	Bias Response mv	Bias ppm	Bias Error
Zero	0	40	0	0.0% ✓
Span	124	4171	120	-1.6% ✓

Calibration Drift

Gas	Initial*		Final	
	ppm	mv	ppm	Drift
Zero	0	40	0	0.0% ✓
Span	119	4171	120	0.4% ✓

*Bias No. 3

BIAS AND CALIBRATION DRIFT

Number 4

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 16:37

SO2

Method: **EPA 6C**

Span Conc. **89.6 ppm**

Bias Results

Gas	Cal	Bias Response		Bias
	ppm	mv	ppm	Error
Zero	0.1	27	0.0	-0.1% ✓
Span	45.3	4301	43.0	-2.6% ✓

Calibration Drift

Gas	Initial*		Final		Drift
	ppm	mv	ppm	mv	
Zero	0.0	27	0.0	27	0.0% ✓
Span	43.0	4301	43.0	4301	0.0% ✓

*Bias No. 3

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CALIBRATION

Number 1

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 10:06

O2

Method: EPA 3A

Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	69
10.0	SG 9101450ALB	4070
19.9	CC 141788	8081

Curve Coefficients

Slope	Intercept	Corr. Coeff.
402.6 ✓	60.7 ✓	>0.9999

CO2

Method: EPA 3A

Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	36
9.9	SG 9101450ALB	3878
19.9	CC 141788	7869

Curve Coefficients

Slope	Intercept	Corr. Coeff.
393.6 ✓	18.0 ✓	>0.9999

WESTON
SOLUTIONS

CALIBRATION

Number 1

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 10:06

CO

Method: EPA 10

Calibration Type: Linear Regression

Calibration Results

ppm	Cylinder ID	Result, mv
Zero	-	38
454	CC 216379	4420
895	CC 116492	8949

Curve Coefficients

Slope	Intercept	Corr. Coeff.
9.954 ✓	-8.5	0.9998

NOx

Method: EPA 7E

Calibration Type: Linear Regression

Calibration Results

ppm	Cylinder ID	Result, mv
Zero	-	37
124	SG9161416BAL	4286
250	CC 147430	8643

Curve Coefficients

Slope	Intercept	Corr. Coeff.
34.38 ✓	37.9	>0.9999

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CALIBRATION

Number 1

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 10:06

SO2

Method: EPA 6C

Calibration Type: Linear Regression

Calibration Results

ppm	Cylinder ID	Result, mv
Zero	-	42
45.5	CC 173666	4528
89.6	CC 29097	8948

Curve Coefficients

Slope	Intercept	Corr. Coeff.
99.39 ✓	29.9 ✓	>0.9999

CALIBRATION ERROR

Number 1

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Starting Time: 10:06

O2

Method: EPA 3A

Slope 402.6 ✓

Intercept 60.7 ✓

Standard, %	Response, mV	%	Error, %
Zero	69	0.0	0.0
10.00	4070	10.0	0.0
19.9	8081	19.9	0.0

CO2

Method: EPA 3A

Slope 393.6 ✓

Intercept 18.0 ✓

Standard, %	Response, mV	%	Error, %
Zero	36	0.0	0.0
9.90	3878	9.8	-0.5
19.9	7869	19.9	0.0

CO

Method: EPA 10

Slope 9.954 ✓

Intercept -8.5

Standard, ppm	Response, mV	ppm	Error, %
Zero	38	5	0.6
454	4420	445	-1.1
895	8949	900	0.5

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CALIBRATION ERROR

Number 1

Client: Bowater
Location: Catawba, S.C.
Source: No.3 Recovery

Project Number: 03917.008.012
Operator: Simpkins
Date: 24 Jul 2007

Starting Time: 10:06

NOx

Method: EPA 7E

Slope 34.38 ✓

Intercept 37.9

Standard, ppm	Response, mV	ppm	Error, %
Zero	37	0	0.0
124	4286	124	0.2
250	8643	250	-0.1

SO2

Method: EPA 6C

Slope 99.39 ✓

Intercept 29.9 ✓

Standard, ppm	Response, mV	ppm	Error, %
Zero	42	0.1	0.1
45.5	4528	45.3	-0.2
89.6	8948	89.7	0.1

J.R.

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ANALYZER INFORMATION

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

File Name: C:\DATA\Bowater Catawba\July 23 2007\No 3 Recovery.cem
Computer: WSAUB59 **Trailer:** 221

Analog Input Device: **Keithley KPCMCIA 16AI Card**

Channel 1

Analyte	O2
Method	EPA 3A, Using Bias
Analyzer Make & Model	CAI 300, 1L12027
Full-Scale Output, mv	10000
Span Concentration, %	19.9

Channel 2

Analyte	CO2
Method	EPA 3A, Using Bias
Analyzer Make & Model	CAI300, 1L12027
Full-Scale Output, mv	10000
Span Concentration, %	19.9

Channel 3

Analyte	CO
Method	EPA 10, Using Bias
Analyzer Make & Model	CAI 300, 1L12027
Full-Scale Output, mv	10000
Span Concentration, ppm	895

Channel 4

Analyte	NOx
Method	EPA 7E, Using Bias
Analyzer Make & Model	CAI400CLD, 6N06002
Full-Scale Output, mv	10000
Span Concentration, ppm	250

ANALYZER INFORMATION

Client: **Bowater**
Location: **Catawba, S.C.**
Source: **No.3 Recovery**

Project Number: **03917.008.012**
Operator: **Simpkins**
Date: **24 Jul 2007**

Channel 5

Analyte	SO2
Method	EPA 6C, Using Bias
Analyzer Make & Model	tek 721M, AB-721M-9
Full-Scale Output, mv	10000
Span Concentration, ppm	89.6





APPENDIX D

LABORATORY DATA

Inter-Office Memorandum



Auburn Operations

TO: Templeton Simpkins cc: file
FROM: Brian Benson *R fa:* DATE: 31 July 2007
PROJECT: Bowater
W.O.NO: 03917.008.012
Job NO: 2007-217
SUBJECT: Method 5 Analysis Results.
ACTION: Analysis of samples received on 26 July 2007.

This letter with attachments constitutes our report of gravimetric determination of the glass fiber filters and water rinse fractions submitted to the laboratory for particulate analysis. The samples arrived in good condition and in accordance with the chain-of-custody. The samples were prepared on 26 July 2007 and analyzed on 27 July 2007 through 31 July 2007. The analysis followed procedures in USEPA Reference Method 5 for particulate emissions from stationary sources.

QUALITY ASSURANCE AND QUALITY CONTROL:

Quality control procedures conformed to the requirements of the reference method and our laboratory quality assurance program. Duplicate filter weights differed less than 0.5 mg or 1% of the total weight less the tare weight, whichever is greater. The water impinger catch fraction blank residue correction was less than 0.001% of the total mass of the wash solvent used; therefore the water impinger catch fractions are blank corrected per EPA method 5. Filter residue weights were not blank corrected.

Substantiating data is on file and available upon request.

tal

attachments

Analysis Report

for Particulates by EPA Method 5

CLIENT : Bowater
 WESTON W.O. No. : 03917.008.012
 WESTON Lab Job No. : 2007-217
 Date Received : 7/26/2007
 Analyst : STH

Balance ID: Mettler AE163
 Lab Ambient Temp (F): 73.4
 Lab Rel Humidity (%): 50
 Barometric Pressure (Hg): 29.15

Source	No. 3 RB			
Field Run No.	ONE	TWO	THREE	FIELD BLANK
LIQUID FRACTION				
Filter ID	CZ 9173	CZ 9174	CZ 9175	CZ 9244
Beaker ID	17-07	18-07	19-07	23-07
Liquid Volume (mL)	79	72	56	120
Constant Initial Weight (g)	106.7618	119.9086	106.7834	105.7203
Constant Final Weight (g)	106.7822	119.9190	106.7898	105.7217
Final-Initial Beaker Wts. (g)	0.0204	0.0104	0.0063	0.0014
Sample/Blank Volume Ratio	0.6583	0.6000	0.4667	
Liquid Blank Correction, $\leq 0.001\%$ (g)	0.0009	0.0008	0.0006	
Liquid Blank Correction, $> 0.001\%$ (g)*	0.0008	0.0007	0.0006	
Liquid Particulate Weight (g)	0.0197	0.0097	0.0058	0.0014
FILTER FRACTION				
Filter ID	CZ 9173	CZ 9174	CZ 9175	CZ 9244
Constant Initial Weight (g)	37.9336	38.9920	39.1321	35.0633
Constant Final Weight (g)	37.9711	39.0207	39.1571	35.0635
Final-Initial Filter Wts. (g)	0.0375	0.0287	0.0251	0.0002
Filter Blank (g)	0.0002	0.0002	0.0002	
Filter Particulate Weight (g)	0.0375	0.0287	0.0251	
SUMMARY				
Filter Particulate Weight (g)	0.0375	0.0287	0.0251	
Liquid Particulate Weight (g)	0.0197	0.0097	0.0058	
Net Particulate Weight (g)	0.0572	0.0384	0.0309	

Negative values are not included in the Net Particulate Weight.

Values are rounded for presentation purposes only, thus values shown may differ from actual calculations.

Sample Recovery Solution**Water****Weight Percent of Blank**

0.0011%

Liquid Fraction

*Note: If the blank liquid fraction has a residue correction of greater than 0.001 percent, then the samples are blank corrected upto 0.001 % of the mass of the wash solvent.

Custody Transfer Record / Lab Service Request

Page 1 of 1

Client: Bowater		ANALYSES REQUESTED		WESTON Analytics USA Corp.	
Work Order No.: 03917-008-012				SAMPLES SHIPPED OR Held Del'd	
Desired TAT: Results Due By:				Ambient Or Frozen Or Damaged	
Project Manager: Simpkins		ANALYTICAL METHOD		Present Or Absent	
Submitted By: Simpkins Phone #: 5627				Lost Or Broken Or NA	
Weston Use Only LAB ID		Client ID/ Sample Description	Matrix	Date Collected	Sample Where
CZ9173	No. 3 RR	Run 1	FISH	7/24/07	
CZ9174		Run 2		7/24/07	
CZ9175		Run 3			
CZ9177	No. 2 & 3 SDTV	Run 1			
CZ9176		Run 2			
CZ9178		Run 3			
CZ9244	BLACK BLKIC D. 172	DILR2		2307120	
	AS 323 Run 1 FISH	DILR2		170779	
	AS 322 Run 2 FISH	DILR2		180772	
	AS 323 Run 3 FISH	DILR2		190756	
	AS 323 Run 4 FISH	DILR2		200782	
	AS 323 Run 5 FISH	DILR2		210781	
	AS 323 Run 6 FISH	DILR2		220760	
TOTAL LISTED ON THIS COC					
RELINQUISHED BY	RECEIVED BY	DATE/TIME	# / CONDITION	RELINQUISHED BY	# / CONDITION
<i>John Simpkins</i>	<i>Jefferson</i>	7/26/07	1/3/07	<i>John Simpkins</i>	

* NOTE:
SAMPLE ID
ON BACK

RECEIVED BY DATE/TIME # / CONDITION RECEIVED BY DATE/TIME # / CONDITION





APPENDIX E

QUALITY CONTROL DATA

EQUIPMENT CALIBRATIONS

Post-Test Meter Calibration Check

Bowater
Catawba, South Carolina

03917.008.012
No. 3 Recovery Furnace

POST-TEST METER Y CALIBRATION CHECK

Meter ID:

Run Number		1	2	3	Mean
Sampling Time, min	(Theta)	60	60	60	60
Meter Volume, ft ³	(Vm)	41.184	36.014	35.597	37.598
Meter Temperature, R	(tm)	566	567	569	567
Barometric Pressure, in. Hg	(Pb)	29.55	29.55	29.55	29.55
Meter Orifice Pressure, in. H ₂ O	(dH)	1.586	1.150	1.133	1.290
Meter Pressure, in. Hg	(Pm)	29.67	29.63	29.63	29.64
Ave Sq Rt Meter Orifice Pressure, in. H ₂ O	((sqrt. dH)ave	1.257	1.070	1.063	1.130
Meter Orifice Calibraion Coefficient, in. H ₂ O	(dH@)	1.894	1.894	1.894	1.894
Dry Mol. Wt. of Stack Gas, lb/lb-mole	(Md)	30.54	30.38	30.36	30.43
Dry Gas Meter Cal. Check Value	(Yqa)	1.0113	0.9886	0.9953	0.9984
Meter Correction Factor	(Y)	1.0090	1.0090	1.0090	1.0090
Mean Percent Difference, %		< +/- 5%			-1.05

STACK TEMPERATURE SENSOR CALIBRATION DATA

Thermocouple Number: AUB-PR-12A Length: 12FT
 Date: 11-Jan-07 Pitot: P41
 Ambient Temperature, °F : 61
 Calibrator: JH

Reference Point Number	Reference Temperature °F	Thermocouple Temperature °F	Temperature Difference %
1 - A	37	36	0.20
	B	36	0.20
	C	35	0.40
2 - A	61	61	0.00
	B	61	0.00
	C	61	0.00
3 - A	215	213	0.30
	B	213	0.30
	C	214	0.15

$$\text{Temp Diff (\%)} = \frac{(\text{Ref Temp, } ^\circ\text{F} + 460) - (\text{Therm Temp } ^\circ\text{F} + 460)}{\text{Ref Temp, } ^\circ\text{F} + 460} \times 100$$

Are all temperature differences less than +/- 1.5% ? YES

POSTTEST STACK TEMPERATURE SENSOR CALIBRATION DATA

Client: Bouwman
 Work Order Number: 03917-908.012
 Date: 7/24/07
 Calibrator: TS

Ambient Temp, °F	Reference Temp, °F	Thermocouple Temp, °F	Temperature Diff, %
85	85	85	0

Was a pretest temperature correction used? yes no

Is temperature difference within +/- 1.5% yes no

If no, calculations done once with recorded values and once with corrected values _____

S - Type Pitot Tube Inspection Data Form

Pitot Tube ID NO. P 41

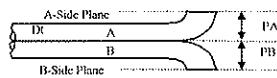
Length 12 FT

Probe ID.No. PR-12A

If all Criteria PASS Cp is equal to 0.84

Inspection Date 1/12/2007 Individual Conducting Inspection JH

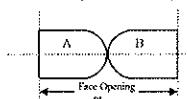
PASS/FAIL



Distance to A Plane (PA) - inches 0.506
Distance to B Plane (PB) - inches 0.506
Pitot OD (D_t) - inches 0.375

$1.05 D_t < P < 1.5 D_t$

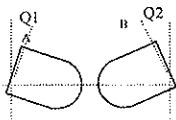
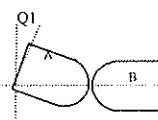
PA must Equal PB



Are Open Faces Aligned Perpendicular to the Tube Axis

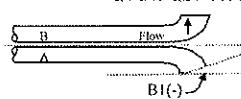
YES NO

PASS

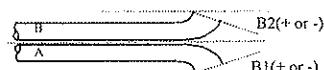


Angle of Q1 from vertical A Tube-degrees (absolute) 1
Angle of Q2 from vertical B Tube-degrees (absolute) 1

Q1 and Q2 must be $\leq 10^\circ$



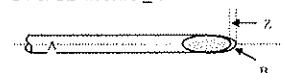
Angle of B1 from vertical A Tube-degrees (absolute) 3



Angle of B1 from vertical B Tube-degrees (absolute) 2

B1 or B2 must be $\leq 5^\circ$

Y = 2 O = 1



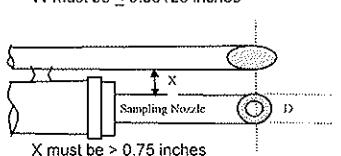
A = 1.012

Z must be ≤ 0.125 inches

Z = A sin Y = 0.0353

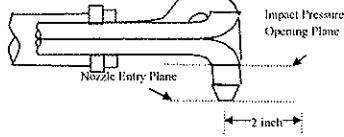
W must be ≤ 0.03125 inches

W = A sin O = 0.0177



Distance between Sample Nozzle and Pitot (X) - inches NA

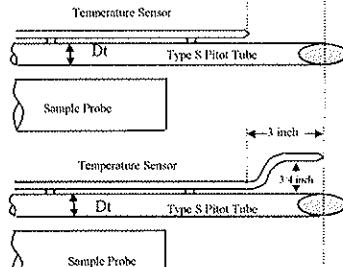
X must be ≥ 0.75 inches



Impact Pressure Opening Plane is above the Nozzle Entry Plane

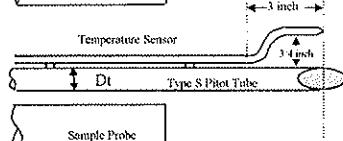
YES NO
 NA

PASS



Thermocouple meets the Distance Criteria in the adjacent figure

YES NO
 NA



Thermocouple meets the Distance Criteria in the adjacent figure

YES NO
 NA

PASS

POSTTEST CHECK

Client Bomber

Work Order Number 08917.008+012

Date 7/24/07

Damage Found? YES

NO

Checked By TS

WESTON
MANUFACTURERS
DESIGNERS CONSULTANTS

NO_x CONVERTER EFFICIENCY

RUN DATA

Number 10

Client: Bowater
Location: Catawba, SC
Source:
Calibration: 1

Project Number:
Operator: T. Simpkins
Date: 9 Aug 2007

Time	O2		CO2		NOx	
	mv	%	mv	%	mv	ppm
Starting time 15:21						
Nox Conversion Efficiency						
CC213155						
NO2- 49.3 ppm						
15:22	8442	20.9	158	0.2	1598	47
15:23	8447	20.9	158	0.2	1611	47
15:24	8447	20.9	155	0.2	1620	48
15:25	8442	20.9	156	0.2	1620	48
15:26	8447	20.9	155	0.2	1618	48
15:27	8442	20.9	152	0.2	1606	47
15:28	8441	20.9	151	0.2	1605	47
Run Avg	8444	20.9	155	0.2	1611	47

CALIBRATION

Number 1

Client: Bowater
Location: Catawba, SC
Source:

Project Number:
Operator: T. Simpkins
Date: 9 Aug 2007

Starting Time: 07:30

O2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	73
9.8	CC 19492	4011
19.9	CC 141788	8022

Curve Coefficients

Slope	Intercept	Corr. Coeff.
399.4	81.1	>0.9999

CO2

Method: EPA 3A
Calibration Type: Linear Regression

Calibration Results

%	Cylinder ID	Result, mv
Zero	-	120
9.9	CC 19492	3942
19.9	CC 141788	8033

Curve Coefficients

Slope	Intercept	Corr. Coeff.
397.7	81.5	0.9999

CALIBRATION

Number 1

Client: Bowater
Location: Catawba, SC
Source:

Project Number:
Operator: T. Simpkins
Date: 9 Aug 2007

Starting Time: 07:30

NOx

Method: EPA 7E
Calibration Type: Linear Regression

Calibration Results

ppm	Cylinder ID	Result, mv
Zero	-	33
124	CC 230971	4149
251	CC 120133	8362

Curve Coefficients

Slope	Intercept	Corr. Coeff.
33.18	34.9	>0.9999



CALIBRATION ERROR

Number 1

Client: Bowater
Location: Catawba, SC
Source:

Project Number:
Operator: T. Simpkins
Date: 9 Aug 2007

Starting Time: 07:30

O₂

Method: EPA 3A

Slope 399.4

Intercept 81.1

Standard, %	Response, mV	%	Error, %
Zero	73	0.0	0.0
9.80	4011	9.8	0.0
19.9	8022	19.9	0.0

CO₂

Method: EPA 3A

Slope 397.7

Intercept 81.5

Standard, %	Response, mV	%	Error, %
Zero	120	0.1	0.5
9.90	3942	9.7	-1.0
19.9	8033	20.0	0.5

NO_x

Method: EPA 7E

Slope 33.18

Intercept 34.9

Standard, ppm	Response, mV	ppm	Error, %
Zero	33	0	0.0
124	4149	124	0.0
251	8362	251	0.0

WESTON
SOLUTIONS

ANALYZER INFORMATION

Client: **Bowater**
Location: **Catawba, SC**
Source:

Project Number:
Operator: **T. Simpkins**
Date: **9 Aug 2007**

File Name: C:\DATA\8907dh.cem
Computer: WSAUB59 **Trailer:** 221

Analog Input Device: **Keithley KPCMCIA 16AI Card**

Channel 1

Analyte	O2
Method	EPA 3A, Using Bias
Analyzer Make, Model & Serial No.	CAI 300, 1L12027
Full-Scale Output, mv	10000
Span Concentration, %	19.9

Channel 2

Analyte	CO2
Method	EPA 3A, Using Bias
Analyzer Make, Model & Serial No.	CAI300, 1L12027
Full-Scale Output, mv	10000
Span Concentration, %	19.9

Channel 4

Analyte	NOx
Method	EPA 7E, Using Bias
Analyzer Make, Model & Serial No.	CAI400CLD, 6N06002
Full-Scale Output, mv	10000
Span Concentration, ppm	251



CALIBRATION GAS CERTIFICATES

Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number: SG9101450ALB Reference Number: 83-124067062-16
Cylinder Pressure: 2000.6 PSIG Expiration Date: 6/13/2009
Certification Date: 6/13/2006 Laboratory: ASG - Port Allen - LA

Airgas Specialty Gases
1075 Cinclare Drive
Port Allen, LA 70767
225.388.0900 Fax: 225.388.0959
www.airgas.com

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
CARBON DIOXIDE	9.946 %	+/- 1%	FTIR	G1
OXYGEN	9.960 %	+/- 1%	Paramagnetic	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature 

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 82658	NITROGEN	OXYGEN	CC14336	9.72 %
NTRM 81674	NITROGEN	CARBON DIOXIDE	XC018732B	6.89 %

Analytical Results

1st Component			2nd Component		
CARBON DIOXIDE			OXYGEN		
1st Analysis Date:	06/13/2006		1st Analysis Date:	06/13/2006	
R 6.96	S 10.06	Z 0.02	Conc 9.946 %	R 9.70	S 9.94
S 10.06	Z 0.02	R 6.98	Conc 9.946 %	S 9.94	Z 0.00
Z 0.00	R 6.98	S 10.06	Conc 9.946 %	Z 0.00	R 9.70
			AVG: 9.946 %		
				Z 0.00	Conc 9.960 %
				R 9.70	Conc 9.960 %
				S 9.94	Conc 9.960 %
				AVG: 9.960 %	

Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number: CC141788 Reference Number: 54-124054020-1
Cylinder Pressure: 2000.6 PSIG Expiration Date: 1/4/2009
Certification Date: 1/4/2006 Laboratory: ASG - Chicago - IL

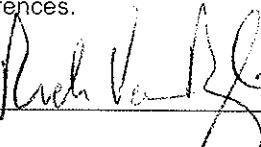
Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
OXYGEN	19.90 %	+/- 1%	Paramagnetic	G1
CARBON DIOXIDE	19.91 %	+/- 1%	NDIR	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature 

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
GMIS 050805		OXYGEN	SG9163060BAL	20.98 %
NTRM 101705		CARBON DIOXIDE	SG9123985BAL	17.89 %

Analytical Results

1st Component			2nd Component			CARBON DIOXIDE		
1st Analysis Date:	01/04/2006		1st Analysis Date:	01/04/2006		Z 0	Conc 19.90 %	
R 20.98	S 19.90	Z 0	R 17.89	S 19.90	Z 0	R 17.89	Conc 19.90 %	
S 19.90	Z 0	R 20.98	S 19.90	Z 0	R 17.89	S 19.93	Conc 19.90 %	
Z 0	R 20.98	S 19.90	AVG: 19.90 %				Conc 19.93 %	
							AVG: 19.91 %	

Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number: CC216379 Reference Number: 83-124080681-2

Cylinder Pressure: 2000.6 PSIG Expiration Date: 12/7/2009

Certification Date: 12/7/2006 Laboratory: ASG - Port Allen - LA

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
CARBON MONOXIDE	454.4 PPM	+/- 1%	NonDispersive Infrared	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature 

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 82636	NITROGEN	CARBON MONOXIDE	XC013398B	246.2 PPM

Analytical Results

1st Component CARBON MONOXIDE

1st Analysis Date: 11/27/2006

R 250.4	S 462.8	Z 0.058	Conc 455.0 PPM
S 463.6	Z 0.028	R 251.0	Conc 454.8 PPM
Z -0.001	R 251.3	S 464.0	Conc 454.6 PPM
			AVG: 454.8 PPM

2nd Analysis Date: 12/07/2006

R 250.9	S 462.2	Z 0.028	Conc 453.6 PPM
S 462.1	Z 0.011	R 250.5	Conc 454.2 PPM
Z -0.009	R 250.6	S 462.3	Conc 454.2 PPM
			AVG: 454.0 PPM

Certificate of Analysis: EPA Protocol Gas Mixture

Airgas Specialty Gases
12722 South Wentworth Avenue
Chicago, IL 60628
www.airgas.com

Cylinder Number: CC116492@ Reference Number: 54-124039388-3
Cylinder Pressure: 1999.6 PSIG Expiration Date: 7/5/2008
Certification Date: 7/5/2005 Laboratory: ASG - Chicago - IL

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
CARBON MONOXIDE	895.1 PPM	+/- 1%	NDIR	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature 

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 52403		CARBON MONOXIDE	SG9152083BAL	973.6 PPM

Analytical Results

1st Component CARBON MONOXIDE

1st Analysis Date: 06/27/2005

R 974	S 893	Z 0	Conc 892.6 PPM
S 895	Z 0	R 974	Conc 894.6 PPM
Z 0	R 974	S 894	Conc 893.6 PPM
			AVG: 893.6 PPM

2nd Analysis Date: 07/05/2005

R 974	S 897	Z 0	Conc 896.6 PPM
S 897	Z 0	R 974	Conc 896.6 PPM
Z 0	R 974	S 897	Conc 896.6 PPM
			AVG: 896.6 PPM



Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number: CC147430 Reference Number: 83-124067062-13
Cylinder Pressure: 2000.6 PSIG Expiration Date: 6/23/2008
Certification Date: 6/23/2006 Laboratory: ASG - Port Allen - LA

Airgas Specialty Gases
1075 Cinclare Drive
Port Allen, LA 70767
(225) 388-0900
FAX: (225) 388-0959
www.airgas.com

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
NITRIC OXIDE	250.0 PPM	+/- 1%	FTIR	G1
NITROGEN	Balance			

Total oxides of nitrogen 250.3 PPM

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 81685x	NITROGEN	NITRIC OXIDE	CC208164	257.0 PPM

Analytical Results

1st Component **NITRIC OXIDE**

1st Analysis Date: 06/16/2006

R 0.459	S 0.448	Z -0.001	Conc 250.6 PPM
S 0.447	Z 0.000	R 0.458	Conc 250.5 PPM
Z -0.000	R 0.458	S 0.445	Conc 249.4 PPM
			AVG: 250.1 PPM

2nd Analysis Date: 06/23/2006

R 0.460	S 0.448	Z 0.000	Conc 249.7 PPM
S 0.449	Z -0.00	R 0.460	Conc 250.5 PPM
Z 0.001	R 0.462	S 0.450	Conc 249.8 PPM

AVG: 250.0 PPM

Office

Part Number: E02NI99E15A3865 Reference Number: 83-124097127-2
 Cylinder Number: SG9161416BAL Cylinder Volume: 144 Cu.Ft.
 Laboratory: ASG - Port Allen - LA Cylinder Pressure: 2015 PSIG
 Analysis Date: Jun 07, 2007 Valve Outlet: 660

Expiration Date: Jun 07, 2009

Certification performed in accordance with "EPA Tracability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 150 psig.i.e. 1 Miga Pascal

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
NITRIC OXIDE	125.0 PPM	123.4 PPM	G1	+/-1% NIST Traceable
NITROGEN	Balance			

Total oxides of nitrogen 123.500 PPM For Reference Only

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	030601	XC024265B	487.6PPM NITRIC OXIDE/NITROGEN	Jun 01, 2007
NTRM	06060223	CC207520	257PPM NITRIC OXIDE/NITROGEN	Jan 01, 2010

*office***Airgas.****Certificate of Analysis: EPA Protocol Gas Mixture**

Cylinder Number: CC173666 Reference Number: 83-124050346-1

Cylinder Pressure: 2015 PSIG Expiration Date: 11/22/2007

Certification Date: 11/22/2005 Laboratory: ASG - Port Allen - LA

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
SULFUR DIOXIDE	45.45 PPM	+/- 1%	FTIR	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Signature on file

Approval Signature**Reference Standard Information**

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 81604	NITROGEN	SULFUR DIOXIDE	XC017362B	98.0 PPM
NTRM 81604	NITROGEN	SULFUR DIOXIDE	XC017660B	98.0 PPM

Analytical Results**1st Component SULFUR DIOXIDE**

1st Analysis Date:	11/14/2005		
R 0.658	S 0.311	Z 0.001	Conc 45.49 PPM
S 0.312	Z 0.001	R 0.658	Conc 45.63 PPM
Z 0.000	R 0.658	S 0.311	Conc 45.45 PPM
			AVG: 45.52 PPM

2nd Analysis Date: 11/21/2005

R 0.659	S 0.311	Z 0.001	Conc 45.39 PPM
S 0.311	Z 0.001	R 0.659	Conc 45.37 PPM
Z 0.000	R 0.659	S 0.311	Conc 45.38 PPM

AVG: 45.38 PPM

Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number: CC29097 Reference Number: 83-124067062-6
Cylinder Pressure: 2000.6 PSIG Expiration Date: 6/19/2008
Certification Date: 6/19/2006 Laboratory: ASG - Port Allen - LA

Airgas Specialty Gases
1075 Cinclare Drive
Port Allen, LA 70767
225.388.0900 Fax: 225.388.0959
www.airgas.com

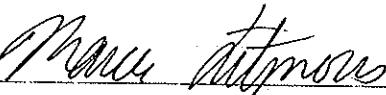
Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
SULFUR DIOXIDE	89.56 PPM	+/- 1%	FTIR	G1
NITROGEN	Balance			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.
Analytical Methodology does not require correction for analytical interferences.

Notes:

Do not use cylinder below 150 psig.

Approval Signature 

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 81694	NITROGEN	SULFUR DIOXIDE	XC017671B	98.0 PPM

Analytical Results**1st Component SULFUR DIOXIDE**

1st Analysis Date: 06/12/2006
R 0.651 S 0.597 Z 0.002 Conc 89.71 PPM
S 0.595 Z 0.001 R 0.650 Conc 89.46 PPM
Z 0.001 R 0.648 S 0.593 Conc 89.45 PPM
AVG: 89.54 PPM

2nd Analysis Date: 06/19/2006
R 0.650 S 0.596 Z 0.001 Conc 89.55 PPM
S 0.596 Z 0.000 R 0.650 Conc 89.67 PPM
Z 0.001 R 0.650 S 0.595 Conc 89.52 PPM
AVG: 89.58 PPM



APPENDIX F

PROCESS OPERATING/PRODUCTION DATA

Start Time 07/24/07 11:00 AM
 End Time 07/24/07 05:00 PM
 Time interval 6.00 min

	Steam Load MPPH 51fi317a.pv	Opacity % 51ai321a.pv	Black Liquor GPM 51fi308.pv	Liquor Solids % 51di307a.pv	# BLS/Hr	MMlbs BLS/day	Equiv. Pulp Prod ADTP/hr
7/24/07 11:00 AM	536.2	7.9	354.6	67.4	154,155	3.70	48
7/24/07 11:06 AM	521.5	8.1	358.3	67.4	155,794	3.74	48
7/24/07 11:12 AM	531.5	7.9	356.0	67.4	154,755	3.71	48
7/24/07 11:18 AM	539.0	8.1	355.1	67.4	154,331	3.70	48
7/24/07 11:24 AM	537.4	7.8	354.7	67.4	154,170	3.70	48
7/24/07 11:30 AM	542.1	7.6	355.2	67.4	154,352	3.70	48
7/24/07 11:36 AM	533.3	7.4	357.0	67.3	155,069	3.72	48
7/24/07 11:42 AM	545.4	7.4	354.4	67.4	154,076	3.70	48
7/24/07 11:48 AM	576.7	7.2	353.1	67.5	153,703	3.69	48
7/24/07 11:54 AM	535.4	7.6	353.0	67.6	153,854	3.69	48
7/24/07 12:00 PM	536.5	7.8	358.0	67.6	156,237	3.75	49
7/24/07 12:06 PM	523.2	7.9	353.3	67.7	154,278	3.70	48
7/24/07 12:12 PM	524.5	7.4	352.5	67.7	153,965	3.70	48
7/24/07 12:18 PM	524.8	7.5	354.8	67.7	155,040	3.72	48
7/24/07 12:24 PM	533.1	7.4	355.3	67.7	155,284	3.73	48
7/24/07 12:30 PM	527.4	7.4	354.4	67.7	154,910	3.72	48
7/24/07 12:36 PM	528.2	8.0	353.6	67.8	154,558	3.71	48
7/24/07 12:42 PM	527.1	8.2	352.9	67.8	154,263	3.70	48
7/24/07 12:48 PM	535.2	7.9	350.8	67.8	153,404	3.68	48
7/24/07 12:54 PM	537.8	7.9	350.8	67.8	153,382	3.68	48
7/24/07 1:00 PM	531.1	7.6	353.4	67.8	154,532	3.71	48
7/24/07 1:06 PM	527.0	7.5	353.8	67.8	154,770	3.71	48
7/24/07 1:12 PM	507.5	7.6	351.9	67.8	153,931	3.69	48
7/24/07 1:18 PM	526.4	7.8	352.4	67.8	154,129	3.70	48
7/24/07 1:24 PM	534.5	7.9	352.8	67.8	154,316	3.70	48
7/24/07 1:30 PM	521.6	7.7	356.2	67.8	155,808	3.74	48
7/24/07 1:36 PM	541.3	7.5	352.8	67.7	154,179	3.70	48
7/24/07 1:42 PM	542.7	7.5	352.1	67.7	153,766	3.69	48
7/24/07 1:48 PM	531.6	7.4	351.7	67.6	153,399	3.68	48
7/24/07 1:54 PM	530.6	7.6	351.4	67.5	153,090	3.67	48
7/24/07 2:00 PM	532.0	7.8	351.1	67.5	152,836	3.67	48
7/24/07 2:06 PM	517.3	7.5	351.2	67.5	152,857	3.67	48
7/24/07 2:12 PM	513.4	7.5	351.5	67.4	152,905	3.67	48
7/24/07 2:18 PM	527.2	7.7	352.4	67.4	153,108	3.67	48
7/24/07 2:24 PM	544.8	7.6	353.2	67.3	153,375	3.68	48
7/24/07 2:30 PM	540.2	7.4	352.4	67.3	152,943	3.67	48
7/24/07 2:36 PM	539.3	7.2	350.7	67.2	152,020	3.65	47
7/24/07 2:42 PM	545.8	7.1	350.9	67.2	152,019	3.65	47
7/24/07 2:48 PM	549.1	7.3	352.1	67.1	152,474	3.66	47
7/24/07 2:54 PM	544.9	7.3	352.8	67.1	152,640	3.66	47
7/24/07 3:00 PM	549.4	7.2	351.0	67.0	151,760	3.64	47
7/24/07 3:06 PM	556.5	6.8	350.6	67.0	151,589	3.64	47
7/24/07 3:12 PM	549.4	7.4	352.4	67.0	152,355	3.66	47
7/24/07 3:18 PM	544.4	7.4	354.8	67.0	153,376	3.68	48
7/24/07 3:24 PM	525.9	6.9	353.2	67.0	152,670	3.66	47
7/24/07 3:30 PM	543.9	6.9	351.1	67.0	151,812	3.64	47
7/24/07 3:36 PM	549.6	7.1	351.7	67.0	152,100	3.65	47
7/24/07 3:42 PM	542.0	7.3	351.2	67.0	151,872	3.64	47
7/24/07 3:48 PM	527.4	7.3	350.3	67.0	151,488	3.64	47
7/24/07 3:54 PM	525.2	7.4	350.0	67.0	151,293	3.63	47
7/24/07 4:00 PM	530.8	7.0	349.8	67.1	151,340	3.63	47
7/24/07 4:06 PM	541.0	6.8	353.4	67.1	152,974	3.67	48
7/24/07 4:12 PM	544.2	6.8	353.6	67.1	153,133	3.68	48
7/24/07 4:18 PM	544.1	6.8	351.0	67.1	152,022	3.65	47
7/24/07 4:24 PM	537.6	6.8	351.0	67.1	152,038	3.65	47
7/24/07 4:30 PM	543.3	6.8	350.9	67.1	151,975	3.65	47
7/24/07 4:36 PM	537.1	6.8	350.5	67.1	151,778	3.64	47
7/24/07 4:42 PM	539.3	7.0	350.2	67.2	151,710	3.64	47
7/24/07 4:48 PM	547.1	7.1	354.6	67.2	153,653	3.69	48
7/24/07 4:54 PM	527.7	7.0	352.7	67.2	152,834	3.67	48
7/24/07 5:00 PM	524.7	8.5	352.0	67.2	152,615	3.66	47
7/24/07 5:06 PM							

Start Time 07/24/07 11:00 AM
 End Time 07/24/07 05:00 PM
 Time interval 6.00 min

	W-I	W-M	W-O	E-I	E-M	E-O						
	51ev233.pv	51ea233.pv	51ev234.pv	51ea234.pv	51ev235.pv	51ea235.pv	51ev230.pv	51ea230.pv	51ev231.pv	51ea231.pv	51ev232.pv	51ea232.pv
07/24/07 11:00 AM	37.7	293.3	42.4	1081.2	42.7	1105.0	49.6	255.0	41.8	1072.1	38.2	1080.6
07/24/07 11:06 AM	37.6	266.9	43.2	1200.6	42.6	1102.8	49.3	272.3	41.8	1071.3	38.0	1079.8
07/24/07 11:12 AM	39.3	336.3	42.4	1128.2	42.7	1102.2	51.3	284.6	41.8	1072.3	38.0	1078.3
07/24/07 11:18 AM	37.9	310.9	41.2	1042.9	42.8	1102.0	49.5	291.6	41.5	1069.7	38.0	1080.5
07/24/07 11:24 AM	37.8	301.7	42.1	1121.1	42.7	1103.6	49.4	283.1	41.4	1072.3	38.0	1078.3
07/24/07 11:30 AM	36.7	301.4	41.9	1104.1	42.8	1104.7	48.8	280.7	41.4	1070.0	38.0	1080.0
07/24/07 11:36 AM	37.5	312.2	41.4	1031.7	42.8	1104.4	50.1	272.0	41.2	1070.3	38.0	1078.0
07/24/07 11:42 AM	39.3	392.0	42.1	1216.8	42.3	1102.7	46.8	262.0	41.6	1067.0	38.0	1079.7
07/24/07 11:48 AM	38.6	349.5	42.6	1292.0	42.2	1101.3	49.7	324.8	41.2	1072.0	38.1	1078.3
07/24/07 11:54 AM	38.1	249.3	42.4	1069.5	43.0	1104.0	49.9	263.7	42.3	1072.6	38.7	1080.0
07/24/07 12:00 PM	38.2	278.5	42.5	1087.2	43.0	1102.7	48.7	235.2	42.1	1076.5	38.6	1081.4
07/24/07 12:06 PM	39.0	289.7	41.9	1042.5	42.9	1102.4	49.7	300.0	41.6	1071.7	38.2	1080.0
07/24/07 12:12 PM	38.4	273.5	41.2	1098.9	42.2	1101.6	50.2	274.2	41.7	1071.3	38.2	1080.0
07/24/07 12:18 PM	38.0	384.7	40.7	1157.5	42.5	1104.0	47.2	254.5	41.4	1072.0	38.2	1079.7
07/24/07 12:24 PM	38.4	453.2	42.9	1331.9	42.0	1103.3	48.1	347.6	41.4	1073.0	38.0	1081.7
07/24/07 12:30 PM	37.5	492.6	41.5	1106.6	42.7	1104.0	48.0	404.2	42.1	1073.3	38.4	1079.0
07/24/07 12:36 PM	36.1	318.1	42.4	1097.0	43.0	1104.7	41.0	294.7	42.4	1073.4	38.9	1081.3
07/24/07 12:42 PM	35.6	294.2	41.5	980.8	43.1	1104.7	46.6	301.6	42.2	1073.3	38.7	1081.0
07/24/07 12:48 PM	38.1	365.3	40.8	1018.0	42.6	1102.0	47.2	310.3	42.1	1071.3	38.6	1081.4
07/24/07 12:54 PM	36.6	382.2	41.8	1178.4	42.0	1100.7	50.2	341.6	41.7	1072.4	38.4	1083.1
07/24/07 01:00 PM	39.4	446.5	42.6	1343.1	42.0	1101.0	48.8	375.6	41.6	1070.3	38.4	1082.3
07/24/07 01:06 PM	39.2	441.4	41.8	1239.8	42.3	1103.7	48.5	325.5	41.7	1073.4	38.5	1083.0
07/24/07 01:12 PM	38.6	463.1	41.5	1197.2	42.7	1102.0	48.8	365.2	41.9	1074.2	38.6	1082.3
07/24/07 01:18 PM	38.2	419.4	41.8	1147.3	42.7	1103.3	48.6	359.0	42.2	1072.3	38.8	1081.7
07/24/07 01:24 PM	38.9	380.2	42.6	1149.7	43.0	1104.7	47.2	289.5	42.0	1071.7	38.8	1084.5
07/24/07 01:30 PM	37.9	343.6	42.1	1093.9	42.8	1102.7	48.5	289.8	42.0	1072.7	38.8	1080.0
07/24/07 01:36 PM	39.1	348.7	42.0	1115.9	42.8	1104.0	48.4	277.7	42.3	1072.9	38.7	1082.3
07/24/07 01:42 PM	38.7	343.3	41.4	1081.8	42.5	1102.0	48.5	293.1	41.8	1073.5	38.4	1080.3
07/24/07 01:48 PM	38.6	324.7	40.9	1069.7	42.4	1103.7	47.9	314.7	41.7	1073.3	38.2	1081.3
07/24/07 01:54 PM	38.8	309.2	41.4	1070.4	43.0	1103.0	48.3	305.0	41.7	1076.0	38.6	1082.3
07/24/07 02:00 PM	38.2	299.3	41.2	1116.2	42.7	1103.6	48.9	330.9	42.0	1075.0	38.5	1082.3
07/24/07 02:06 PM	37.6	290.2	42.2	1203.0	42.7	1104.7	49.1	273.5	42.0	1074.3	38.8	1082.8
07/24/07 02:12 PM	35.2	276.7	40.0	1050.1	42.6	1104.4	49.7	275.5	41.8	1073.7	38.4	1082.5
07/24/07 02:18 PM	38.9	313.3	42.0	1138.8	42.9	1105.6	48.9	289.0	41.7	1072.7	38.2	1082.0
07/24/07 02:24 PM	37.5	312.9	40.7	1078.1	42.6	1105.0	50.5	310.7	41.7	1073.0	38.1	1082.0
07/24/07 02:30 PM	38.4	332.8	41.3	1185.1	42.0	1103.0	50.1	298.7	41.3	1075.0	38.0	1081.7
07/24/07 02:36 PM	38.4	319.0	42.1	1219.0	42.0	1103.7	49.0	268.0	41.0	1070.0	38.0	1081.0
07/24/07 02:42 PM	38.9	321.8	41.7	1142.9	42.2	1104.0	51.8	307.0	41.3	1073.6	38.0	1081.0
07/24/07 02:48 PM	37.7	274.1	40.5	1021.2	42.3	1103.3	48.6	277.3	41.2	1074.0	38.0	1082.2
07/24/07 02:54 PM	38.1	290.4	40.2	1075.9	42.2	1103.0	50.5	298.6	41.0	1073.7	38.0	1082.3
07/24/07 03:00 PM	36.2	263.2	41.1	1147.3	41.8	1103.0	49.4	280.2	40.8	1070.7	37.9	1080.4
07/24/07 03:06 PM	38.0	274.8	41.2	1151.0	41.8	1100.0	49.9	283.7	40.9	1072.5	37.9	1079.6
07/24/07 03:12 PM	38.0	296.5	42.3	1326.3	41.8	1101.0	48.1	249.6	41.2	1071.8	38.0	1082.0
07/24/07 03:18 PM	35.8	322.2	42.2	1366.4	41.4	1101.3	47.9	278.3	40.8	1073.0	38.0	1081.3
07/24/07 03:24 PM	37.8	317.1	42.3	1387.8	41.3	1101.6	49.4	321.2	40.5	1070.6	38.0	1081.0
07/24/07 03:30 PM	37.3	349.4	40.9	1238.0	41.8	1103.3	47.9	322.4	40.8	1070.0	38.0	1081.4
07/24/07 03:36 PM	38.4	322.2	41.4	1105.4	42.2	1103.6	46.7	262.5	41.1	1072.6	38.0	1081.0
07/24/07 03:42 PM	37.4	267.8	41.0	1134.4	42.0	1104.0	48.9	259.0	41.4	1069.7	38.0	1081.3
07/24/07 03:48 PM	38.2	305.9	41.0	1093.8	42.0	1105.0	48.6	286.7	41.0	1073.0	38.0	1080.0
07/24/07 03:54 PM	38.7	278.5	42.1	1185.0	42.2	1103.3	50.6	331.1	40.8	1072.3	38.0	1080.6
07/24/07 04:00 PM	37.6	250.4	42.2	1250.7	41.8	1102.0	51.2	354.3	40.8	1071.1	38.0	1081.0
07/24/07 04:06 PM	37.9	279.7	41.8	1323.8	41.6	1100.7	49.8	302.3	40.9	1072.6	38.0	1081.4
07/24/07 04:12 PM	37.5	291.7	41.4	1298.3	41.3	1101.0	50.4	307.8	40.8	1071.7	37.8	1080.3
07/24/07 04:18 PM	37.9	294.6	40.3	1162.3	41.5	1100.7	51.1	326.8	40.7	1072.3	38.0	1079.3
07/24/07 04:24 PM	38.6	341.6	40.2	1171.3	41.3	1101.2	50.5	331.9	40.1	1069.8	37.8	1081.0
07/24/07 04:30 PM	37.6	325.7	40.6	1158.6	41.7	1102.4	50.8	364.0	40.0	1067.6	37.8	1078.3
07/24/07 04:36 PM	38.3	377.2	40.8	1283.1	41.4	1103.0	51.0	375.0	40.0	1069.7	37.6	1080.5
07/24/07 04:42 PM	38.5	356.3	41.6	1273.7	41.8	1101.3	49.4	325.4	40.4	1073.7	37.8	1079.3
07/24/07 04:48 PM	36.5	348.6	41.1	1253.7	41.4	1102.3	49.3	340.5	40.7	1072.6	38.0	1080.7
07/24/07 04:54 PM	35.9	268.5	41.1	1024.9	42.3	1103.3	50.8	326.8	41.4	1074.3	38.0	1082.5
07/24/07 05:00 PM												

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